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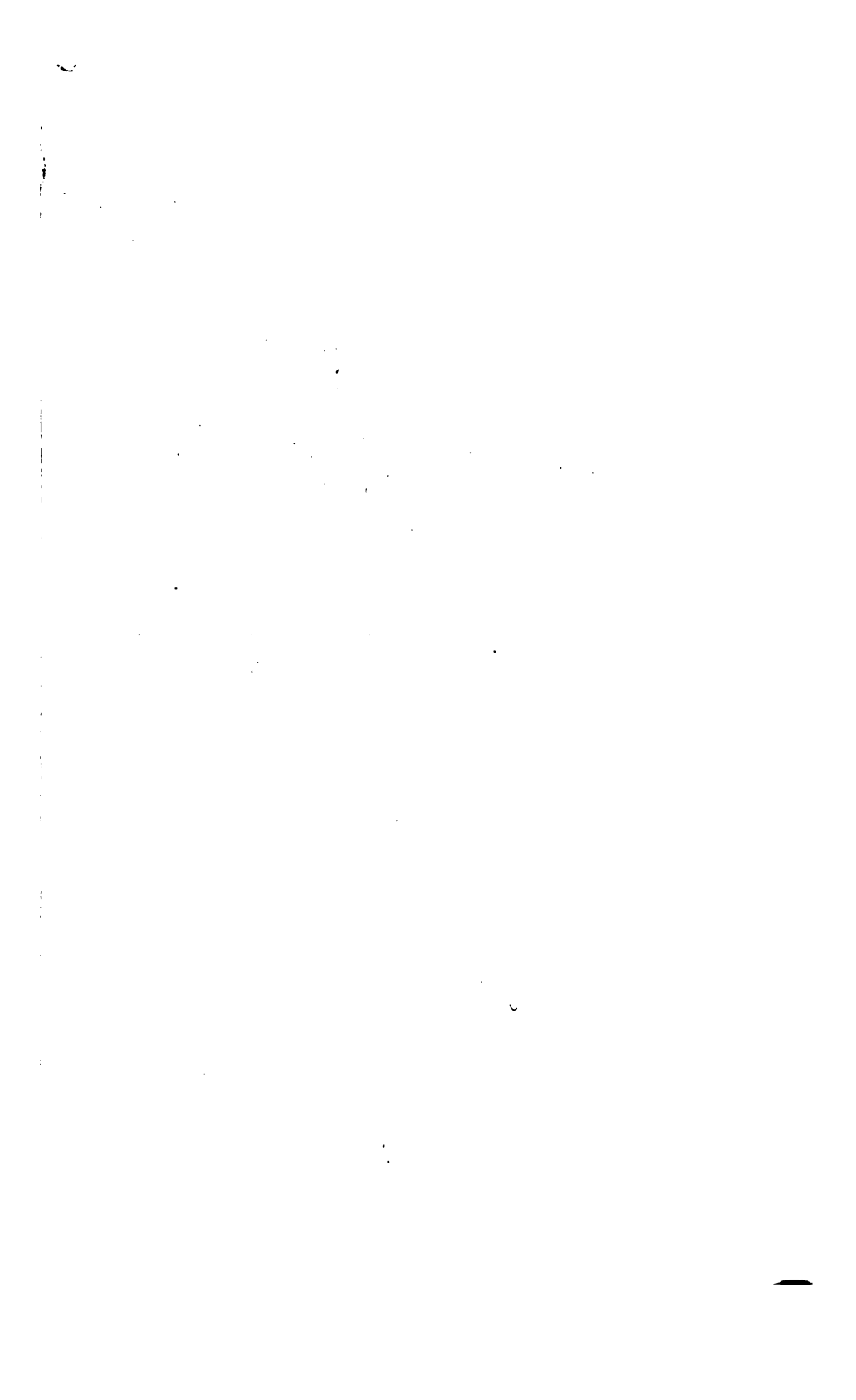
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48/3
1843
AN ORATION,

DELIVERED BEFORE THE

CINCINNATI ASTRONOMICAL SOCIETY,

ON THE OCCASION OF

Laying the Corner Stone

OF

AN ASTRONOMICAL OBSERVATORY,

ON THE 10th OF NOVEMBER, 1843.

BY

JOHN QUINCY ADAMS.

CINCINNATI:

PRINTED BY SHEPARD & CO.

1843.



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Cincinnati, July 19th, 1843.

HON. JOHN QUINCY ADAMS,

Dear Sir:—

This letter will be presented by Professor MITCHEL, Astronomer of "The Cincinnati Astronomical Society," who is the bearer of a resolution, unanimously passed at a full meeting of the Society, requesting him, to wait on you at Quincy, and in their name, to solicit you to lay the corner stone of their Observatory, at such time as will be most convenient to yourself.

The high veneration entertained by the Society, for your character—a knowledge of the arduous, disinterested duties, you have rendered your country, and a belief that the granting of *this* request, will ensure the accomplishment of their object, has induced them, to direct their attention to you, on this occasion.

Permit me to add my most anxious hope, that it will be in your power to grant their request. Should it be so, you will be met by thousands of your fellow citizens, who venerate your character, but whose situation in life, hitherto, has prevented them from tendering to you, manifestations of their respect and friendship.

Most respectfully,

Your friend
and admirer,

J. BURNET.

Niagara Falls, July 25th, 1843.

Professor O. M. MITCHEL,

Dear Sir:—

I have received with deep sensibility, the resolutions of the "Cincinnati Astronomical Society," which were delivered to me personally by you; and with the blessing of God, will perform the duty assigned to me by the Society, on the day which may suit the convenience of the society during the ensuing month of November.

With great respect, I am, dear sir, Your ob't. serv't.

JOHN QUINCY ADAMS.

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NOTE.—Mr. ADAMS reached the city of Cincinnati, on the 8th of November, and the ceremony of laying the Corner Stone of the Observatory was performed on the following day. Mr. ADAMS was introduced to the Society, and the multitude present, in the following address:—

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JUDGE BURNET'S ADDRESS.

MR. ADAMS—FELLOW-CITIZENS:

It becomes my duty on this occasion, to present to you a scholar and statesman, whom the intelligent of all countries delight to honor. Being a son of one of the framers and defenders of the Declaration of Independence, his political principles were formed in the school of the sages of the Revolution, from whom he imbibed the spirit of liberty, while he was yet a boy.

Having been brought up among the immediate descendants of the puritan fathers, whose landing in Massachusetts in the winter of 1620, gave immortality to the rock of Plymouth, his moral and religious impressions were derived from a source of the most rigid purity; and his manners and habits were formed in a community, where ostentation and extravagance had no place. In this fact, we see why it is, that he has always been distinguished for purity of motive, simplicity of manners, and republican plainness in his style of living, and in his intercourse with society. To the same causes may be ascribed, his firmness, his directness of purpose, and his unyielding adherence to personal, as well as to political liberty. You have recently seen him stand, as unmoved as the rock of Gibraltar, defending the right of petition, and the constitutional privileges of the representatives of the people, assembled in Congress, though fiercely assailed by friends and by foes.

His early education was peculiarly calculated to fit him for the duties of a statesman. It was superintended and directed by his father, an accomplished scholar, and a commanding orator. It commenced with the Revolutionary struggle, and was completed about the time the independence of the colonies was formally acknowledged by Great Britain. During a large portion of that period, he was with his father in Europe, and consequently mingling with the most distinguished statesmen of the day; listening to their instructive discussions—acquiring a knowledge of the principles on which the claims of his country were based—the course of reasoning by which they were sustained, and, also, the manner of conducting important negotiations, in which difficulties presented

themselves at every step, and where incessant perseverance, moderated by sound discretion, was indispensable to success.

He seems to have been a child of the revolution, and a pupil of the great men who conducted it. His proficiency in the acquirement of science, and of diplomatic skill was so rapid, that before he attained the age of manhood, he was intrusted by the American government with an important diplomatic duty at the court of Russia. After he returned to his native state, he devoted himself to the pursuits of literature and science; but his talents having become generally known, and justly appreciated, general WASHINGTON, who was remarkable for his accuracy in estimating character, selected him, before he had arrived at the age of thirty years, to be one of the diplomatic agents of this country to the governments of Europe. In 1794, with the advice and consent of the senate, he appointed him minister resident of the United States of America, to their high mightinesses, the states general of the United Netherlands; and having discharged the duties of that trust to the satisfaction of his government, he was appointed minister plenipotentiary, at Lisbon, in 1796. In 1797, president ADAMS appointed him minister to Prussia, on the advice and written recommendation of ex-president WASHINGTON.

Such was the commencement of the public career of our respected guest, who was called from the calm retreats of science, within the walls of his alma mater, into the bustle of political life, by the father of his country, who promptly assumed the responsibility of vouching to the nation for his talents, his integrity, and his fidelity. In other words, he applied to him the comprehensive test of qualification, adopted by Mr. JEFFERSON, that he was "honest, capable, and faithful to the constitution." In addition to this testimony, derived from such an exalted source, it is universally admitted, that he has been uninfluenced by private or selfish considerations in the discharge of official duty; and so strongly was this trait of character illustrated in his administration, that at the close of his presidential term, it was said by men of both parties, that he was too honest for the age in which he lived.

It was a remarkable fact, that during the whole of his public life, which has already continued more than half a century, he never connected himself with a political party, or held himself bound to support or oppose any measure, for the purpose of advancing or re-

tarding the views of a party; but he has held himself free, at all times, to pursue the course which duty pointed out, however he may have been considered by some, as adhering to a party. This fact discloses the reason why he has been applauded, at times, and at other times, censured by every party which has existed under the government. The truth is, that, while the American people have been divided into two great political sections, each contending for its own aggrandizement, Mr. ADAMS has stood between them, uninfluenced by either, contending for the aggrandizement of the nation. His life has been, in some respects, *sui generis*, and I venture the opinion, that generally, when his course has differed most from the politicians opposed to him, it has tended most to the advancement of the public good.

It is my duty, here, to say, that our venerated guest was an early friend of our infant institution. When professor MITCHEL called on him, at the seat of government, on his way to embark for Europe, he was received with kindness, and with manifestations of deep interest, in the success of the enterprise. The letters of introduction which he received from Mr. ADAMS, to the literati of Europe, gave him a certain passport to their confidence and friendship. Hence the astronomer royal at Greenwich received him with open arms—gave him a permit to visit the observatory, at all hours—to aid in the intricate calculations required of his assistants, and even to make his house his home; an honor, never, perhaps, before conferred on a stranger. Through the influence of those letters, he met a like reception from the astronomer royal, at Paris, who took pleasure in performing the friendly offices solicited by those letters. On the arrival of Mr. MITCHEL at Munich, he met, through the same influences, a similar reception from the literati of that city. In fact, all those distinguished men, received him with great kindness, and omitted nothing in their power to advance the object of his journey. But it is not necessary to recite these things. His devotion to the cause of science, generally, and his desire to advance the interest of this institution, is seen in the fact, that he is here this day, in person, at his advanced period of life, having performed a journey of a thousand miles, in an inclement season, to give character and consequence to the proceedings of this day. Efforts and sacrifices like these, outweigh professions and promises; they speak a language which cannot be

misunderstood. It is, also, worthy of note, that this fatiguing journey has been undertaken to gratify the people of the west, and give countenance to one of their infant institutions. This need not excite surprise, for who does not know, that in every station in life, in which he has been placed, he has been the uniform friend and advocate of western interests. In this, he treads in the steps of his venerated father, to whose firmness we are indebted, for the beautiful country we here occupy. To explain this remark, I ought here to state the substance of a communication, I had the honor of making in the territorial legislature of 1799, which was embraced in an address, reported to that body by a committee, of which I was one—adopted by them, and presented to that venerated statesman, then the president of the United States,—that in settling the preliminary articles of peace, at Paris, in the fall of 1782, the British commissioners demanded the Ohio river, as their southern boundary. The French court favored the claim, and Dr. FRANKLIN, under the influence of the Count de VERGENNES, was disposed to acquiesce, but Mr. ADAMS protested against it—declared it inadmissible, and claimed the Lakes as our boundary. This he did, on the ground, that general G. R. CLARKE had conquered the country north of the Ohio, and was then in the actual military occupation of it. Mr. JAY very cordially and zealously united with Mr. ADAMS; and, after a warm, passionate, protracted discussion, in which the dignity of the British commissioners was very much lowered, they reluctantly gave up the point, with a bad grace, and the Lakes became our boundary. In the course of the discussion, Mr. ADAMS declared, with great firmness, that sooner than yield to the demand of the British commissioners, he would return home and advise Congress to continue the war, as long as they had a musket left, and a man to shoulder it. I give the substance, if not the words of the American negotiator.

As a proof of the desire Mr. ADAMS has always cherished, for the advancement of science, I might refer to his annual Message to Congress, in December 1825, in which he recommended the establishment of a National University, and an Astronomical Observatory; and referred to the hundred and thirty of those "lighthouses of the skies" existing in Europe, as casting a reproach on our country, for its unpardonable negligence on that important subject. The manner in which that recommendation was receiv-

ed, and treated, can never be forgotten. It must, at this day, be a source of great comfort to that devoted friend of science, that those who yet survive, of the highly excited party, which attempted to cast on him reproach and ridicule for that proposition, and especially for assimilating those establishments, to light-houses of the skies, have recently admitted the wisdom of his advice, by making ample appropriations to accomplish the very object, he then proposed.

In the midst of great and pressing public duties, which have fastened their claims on his time, in almost every period of his life, he has steadily pursued the study of the sciences, and has even courted the Muses with success. To enable him to do so, without neglecting other duties, hours, devoted by the multitude to recreation and pleasure, in various forms, have been saved by him, and employed in scientific researches. But his delicacy, in every thing relating to himself, has been such, that the world has a very imperfect idea, of the extent, to which these researches have been carried. One fact however, speaks a volume on this subject:—The literati of Europe and America, with one accord, and with great pride, recognize him as a distinguished member of their corps.

The reproach formerly cast on him, and other distinguished men, in public life, recalls to memory the case of the great orator and patriot of Ireland, who, in prospect of the fatal sentence which awaited him, left it, as a dying injunction, on all his survivors, not to suffer his epitaph to be written, during the existence of that generation. And why? Because there was not enough of honesty in his enemies to do justice to his name, and his fame, and because the prejudice, which had been excited against him, was so indelibly pressed upon the public mind, and the government was so firmly resolved to destroy his character, and rob it of its influence, that it was not in the power of his friends to give publicity and credence to half the facts which attested his purity and his patriotism. Therefore, it was, that he bequeathed to posterity that delicate, and to him, highly interesting duty, by uttering this solemn injunction—“*let posterity write my epitaph.*” Unfortunately, the fate of Emmet, in that one particular—the loss of character, is not peculiar to himself. Multitudes in our own country, as pure and patriotic as he, who have spent the prime of their

lives, with integrity and zeal, in the service of their country, have been so misrepresented, abused and slandered, that they might well dread the publication of their biographies, from the pen of almost any of the writers of the day. This injustice has been so general, that scarcely a distinguished politician, of this or the preceding generation, has escaped it. That class of men of every party, seem to have been doomed to one and the same fate. In the common departments of life, the principle is recognized, that the laborer is worthy of his hire, but in the department of government, that rule is reversed. The order seems to be, that in proportion to the ability, integrity and fidelity of a public servant, shall his character be assailed, and his public virtue questioned. In common with all these distinguished characters, Mr. ADAMS has received a full measure of insult and abuse from the supporters of political aspirants, in whose way he was supposed to stand; but the time has, at length come, when men of all parties are prepared to do him justice. Fortunately, his eventful life has been prolonged, till in his own case, he sees one instance, of the reversal of the proverb, that "ingratitude is the sin of republics." True, he waited long for justice—for simple justice, at the hands of his countrymen. At length, however, it has come, as did the liberty of the Roman shepherd, after the frost of age had bleached the locks on his head, and whitened the beard on his chin—

*"Quae sera, tamen respexit, inertem;
Candidior postquam tondenti barba cadebat:
Respexit tamen, et longo post tempore venit."*

We have before us, in the person of our distinguished guest, a case in which the American people are doing justice to a faithful public servant, and it is my firm belief, that the injustice done, to the reputation of so many of our public men, originates in self interest or in malice—that it is confined to a few individuals, and that it does not spring from any desire, inherent in the people, to act unjustly. As to them, it is the result of an erroneous opinion, produced by the publication of falsehood; and I must believe, that whenever the influence of such misrepresentation ceases, and the multitude become satisfied of the fidelity of their agents, they will, unhesitatingly yield to the truth, and restore them to public

confidence; and may heaven grant, that ample justice be done to every persecuted patriot of the country, to whatever party he may belong.

Is there one in this great assembly, who has marked the course of Mr. ADAMS, and does not feel deep regret, arising from reflection, that there is but a remnant of his valuable life remaining? But duty requires the suppression of such unpleasant thoughts. It admonishes us to study the example of disinterested patriotism, exhibited in his life, and to draw lessons of instruction from it. This remark will, I trust, at this day, meet a favorable response, as it is now admitted, that the honor and prosperity of the nation, have been the great mark at which he has aimed in the discharge of his public duties.

Such, fellow citizens, is the sage and patriot, JOHN QUINCY ADAMS, whom I now present to you.

Mr. ADAMS then arose and said:

“FELLOW CITIZENS:—

If there be an individual in this assembly, who does not think, that (after hearing the eloquent discourse of my venerable friend, who has done me the honor of presenting me to you,) my own duty would be to hide my head in shame; I will say to myself, if I do not so, it is my respect for my friend that prevents me.

Fellow Citizens—it is undoubtedly true, and has been a maxim in all time, for men desirous of obtaining approbation and praise from their contemporaries, to long for such praise from men entitled to praise themselves. And in that consideration, if I feel at this moment overwhelmed, by the kindness and partiality of my friend, I shall only ask it of you, as a favor, that you will indulge me with remaining silent concerning it.

I come here for another purpose—I am about to address you for a term of time, which I am afraid you will all think far too long, upon a subject, in which I have no other personal interest and concern, than that of every individual upon the face of the earth. I came under a letter of invitation from the venerable gentleman himself, who is president of the society, formed in this city, for pur-

poses useful to mankind, useful to our country, useful to the city to which you belong. It was in consideration of these circumstances, that when the invitation was extended to me, I found it impossible to hesitate a moment. I came upon that summons, believing that I was doing a service to my country and to mankind.

And with these preliminary observations, you will permit me now to address you, in the manner requested in the invitation which I received. It is upon a topic far less interesting to you, than many others in which an interest is taken. It is about topics connected with dry, scientific inquiry, capable of no such display as many others. And it will appear to you to be dry, flat, and unprofitable. You will, therefore, indulge me by imputing this, partly to the subject, and not entirely to the speaker.

THE ORATION.

*Fellow Citizens of the Astronomical Society of Cincinnati,
Fellow Citizens, Ladies and Gentlemen—*

WHEN the people of thirteen colonies separately chartered by a succession of English kings, on a portion of the continent of North America, united to assume to themselves the transcendent powers of sovereignty, and to declare the ties of their allegiance to their sovereign beyond the seas, forever dissolved, they appealed for their justification in the performance of an act, which, without that resort would have been a crime of the deepest dye that can be committed by human hands—Treason against their country, to the Supreme judge of the world, and to the primitive rights bestowed by Him upon them and upon all mankind, by the laws of nature, antecedent and paramount to all human association, or human government—They appealed to their rights as *men*, and they declared that they held those rights to be self-evident truths—That they held them in common with all mankind; because all men were born equal—That bestowed as they were by God, their creator, they never could be divested of them, even by themselves, and much less could they be wrested from them, by the might of others—That unless for-

feited by his own wrong every individual of the human race comes into being, endowed with those rights, and that if the whole compass of human power could be concentrated in one arm, it would be impotent to take away, however it might ravish or prostrate those rights personified in the meanest individual of the breed of man, crawling upon the face of the earth.

What an exalted and sublime idea of the character of man! How must our nature swell with pride, at the consciousness of being members of a community by the fundamental principles of which, every soul belonging to it, is born to the inheritance of freedom;—Born with rights which he may forfeit by his own wrong, but otherwise inaccessible to human power! Government had never before been explicitly declared to be based on this foundation. Governments had by the people of England been declared to be founded on a compact between the sovereign and the people, and they had been classified as monarchies, aristocracies, or democracies, all of which had been said to be liable to degenerate: the monarchy into tyranny, the aristocracy into oligarchy, and the democracy into ochlocracy or the government of a lawless multitude. But it was admitted on all sides, by the votaries of each of the three simple forms, that government once instituted must necessarily be absolute and unlimited. And although the existence of primitive rights belonging to man at his birth, was admitted, it was asserted, that by entering into the social compact, man surrendered *all* his rights, and took in return, such as the ruling power was pleased to bestow upon him. The Declaration of Independence acknowledges no such principle. It recognizes no despotism, monarchical, aristocratic or democratic. It declares individual man, born with rights, of which, while blamelessly possessed, no government can deprive him. But by the very nature of the grant, the right can be possessed, only upon the condition, of respecting the same rights in all other men. The laws of nature and of nature's God therefore are laws of duty, as well as laws of right. Nature says to every individual man, your rights are all held by the tenure of reverence for the same rights, in all other men. If you infringe the right of any other man, you place yourself at war with your brother, and in assailing any one of his rights, you make him the master of your own.

The *natural* equality of mankind, is thus the parent of universal

freedom. It follows irresistibly, from the fact, that man is at once a rational and a social being. His reason is given him by his Creator to govern his conduct through life, and he can neither be deprived of it by violence, nor can he transfer it to another. And hence the rights derived from it, are declared to be inalienable.

There is a point of view, from which this new modeling of the institution of civil society, is to be considered, with reference to the special subject upon which I have been honored with your invitation at this time to address you. The intuitive genius of Shakespeare, which made the creative imaginations of the drama, the vehicle of inspiration to the noblest maxims, and the sublimest principles of morals, has said, in one of his immortal conceptions —

“ Nature never lends

“ The smallest parcel of her excellence,

“ But like a thrifty goddess she determines

“ Herself the glory of a creditor —

“ Both thanks — and use.”

The license of poetry, substitutes the name of Nature, as the hand-maid of the omnipotent Creator of the worlds, and allows her to prescribe the conditions, and to exact the returns to the bounties which he bestows upon the creatures of his hands. It is God, the grants of whose favor, are instruments of beneficent power, and who in imparting them to his rational offspring, exacts the twofold return of thanks, and use. And thus the acknowledgment of the unalienable right of man to life, liberty and the pursuit of happiness, is at the same time an acknowledgment of the omnipotence, the omniscience and the all-pervading goodness of God. Man thus endowed, is a being of loftier port, of larger dimensions, of infinitely increased and multiplied powers, and of heavier and deeper responsibilities, than man invested with no such attributes or capacities. If then it be true, that man is born with unalienable rights, among which are life, liberty and the pursuit of happiness, it is equally true, that he is born under the deepest and most indispensable duties of ceaseless gratitude to his Maker, for the grant of these endowments, and of exercising, maintaining and supporting them, by all the faculties, intellectual and physical, with which he has been provided to that end. Nor is the duty less peremptory and irremissible, of holding

and enjoying these rights, with the inviolate respect and observance of the same rights in others.

Man is a social and a rational being; for the enjoyment of life, the wants of nature require, and the exercise of his liberty enables him to provide, from the world around him, food for his subsistence. In the pursuit of happiness, his first impulse is to the society of domestic life; by the exercise of liberty, this society is formed by mutual consent, and thus the foundation is laid of families, which, in process of time, swell into tribes, and tribes multiply into nations. The pursuit of happiness then, calls for the institution of governments, to regulate and adjust the collisions of interest and of passions, incident to the existence of civil society—to secure as far as the infirmities of human nature will admit, the rights of every one, by the organized and co-operating energy of all, and to harmonize the discordant elements of the social compact.

Now the position to which I would invite your earnest and anxious consideration, is this: That the form of government, founded upon the principle of the natural equality of mankind, and of which the unalienable rights of individual man, are the corner stone, is the form of government best adapted to the pursuit of happiness, as well of every individual, as of the community. It is the only actual or imaginable human government, in which self-love and social, are the same; and I think I am fully warranted in adding, that in proportion as the existing governments of the earth, approximate to, or recede from, that standard, in the same proportion, is the pursuit of happiness, of the community and of every individual belonging to it, promoted or impeded, accomplished or demolished. It is the true republic of Montesquieu—the government, of which *virtue* is the seminal principle, and that virtue consisting of the love implanted in every bosom of the community of which it is a member.

Of such a government, intense patriotism must be the vital spark; animated by the immortal spirit of christian benevolence, which enjoins self-love as the standard of brotherly affection, and proclaims all mankind as a brotherhood of one kindred blood. The whole soul of every citizen of such a republic, must be devoted to improve the condition of his country and of mankind; while liberty allows and stimulates him to the constant exercise of all the faculties of body and of mind, with which he has been endowed by

his Creator, to elevate, adorn and beautify the land of his nativity, or of his choice.

Education multiplies and sharpens all these faculties. Liberty inspires his head with thought, and nerves his arm for action, while patriotism supplies a perpetual incentive to exertion. Man issues from the hand of his Maker, a frail and imperfect being. His life begins in helpless infancy, and closes in the clod of the valley. Evils, physical, moral, intellectual, beset his path from the cradle to the grave, and warn him that his condition here on earth, is a state of probation, to fit him for a fairer and a better world, toward which he is wending his toilsome way; and in his progress to which, every step of improvement in his present condition, approximates him to that boundary beyond which sorrow and grief are unknown, and where the pure in spirit will find that perfection, which must be denied to them on earth.

In the pursuit of happiness, liberty is indispensable to the exercise of his faculties. Were his hands given him to be manacled or tied? Were his feet given him to be fettered or cramped into impotence? How absurd do these questions appear to you; and yet, read the history of your race, and see how they have been manacled, and fettered and cramped, till their limbs have been disabled, by torture, to the purposes for which they were given to them by their Maker.

Man is a curious and inquisitive being, and the exercise of his reason, the immortal part of his nature, consists of inquiries into the relations between the effects which fall within the sphere of his observation, and their causes, which are unseen. The earth beneath his feet, and the vault of heaven over his head, are the first objects, in physical nature, which force themselves upon his observation, and invite him to contemplation. The earth and the sky, elements so different in their nature, yet indissolubly united by the mysterious mandate of Almighty power, indicate to his perception, and fore-show to his reason, the condition of his own existence, compounded of body and soul, of matter and of mind. The earth ministers to each and all of his senses, the knowledge of its physical properties. He sees, hears, feels, inhales and tastes of earth and its productions, adapted to his subsistence, and to the necessities of his life on earth. The sky is accessible only to his sight, and although peopled with splendors, dazzling in brightness and infinite in numbers, still pre-

sents to his bewildered imagination only the lights of the firmament, like a halo of glory surrounding the universe, but glowing at distances too remote to come within the reach of any other of his senses. He soon discovers, that distant as the great luminary of heaven may be from the earth, yet the earth could not exist without his generative beams; and that the heavens declare the glory of God, and the firmament sheweth forth his handy work. He turns to the heavens his eyes, and inquires what are those innumerable spangles glowing on the brow of night, and extending into the regions of infinite space, till the visual orbs of man, can no longer follow, or discern them. Still he looks and searches for causes, as new celestial phenomena daily and nightly disclose themselves to his view, till the observation of the stars ripens into an art, and the germ of astronomical science has taken root in his memory.— Among the earliest of his wants for the conduct of his life, are standards for the divisions of time. In the revolutions of the earth round her axis, he finds the divisions of day and night. In her revolution in her orbit round the sun, he finds the succession of years; and in the phases of the moon around herself, the measure of the month.

So peculiarly adapted to the nature of man, is the study of the heavens, that of all animated nature, his bodily frame is constructed, as if the observation of the stars was the special purpose of his creation. This peculiar adaptation of the mechanism of the human body, has not escaped the notice of the most ingenious of the Roman poets, who, in his fabulous account of the creation, by, he knows not what God, in concluding with the production of man, says, that while other animals were formed to look downwards to the earth, he gave to man a heavenward looking face, to gaze at the sky, and commanded him to raise his head, and turn his eyes towards the stars —

*Pronaque, dum spectant animalia cetera terram;
Os homini sublime dedit, cœlumque tueri
Jussit et erectos ad sidera tollere vultus.*

Nor was it curiosity alone, which prompted the mind of the primitive man, to search the secrets of the skies. Nature unfolds to him in the structure of the firmament, scenes of unparalleled magnificence, wonder, and astonishment. In leaving to man the task of

ascertaining the causes of the phenomena which he is intensely and incessantly occupied in observing, she seems devoted to the purpose of baffling his anxious inquiries, and sporting with his honest exertions. There are numerous optical illusions in the apparent movement of the heavenly bodies, and the report of the orb of vision, is never consistent with itself; never consists of the truth. The imagination becomes heated, and shadows the forms of things unknown. Superstition takes possession of the soul and the universe swarms with spectral shadows, ministering mischief and agonizing the bosom with ideal wretchedness. The first inquiry which presses itself upon the observation, is to ascertain how far the movement of the stars bears on the condition of his own existence. He sees the constant influence, beneficent or pernicious of the sun, upon the earth and all her inhabitants. He sees that the sun-beam is the source of all animal and vegetable life, and that the same sun-beam withers the plant at its root, curdles the blood in the pestilence, and speeds the bolt of death in the lightning's fork. This indissoluble connection between earth and heaven, is palpable and unquestionable. But the same firmament, in one small portion of which, the sun and his tributary planets revolve, swarms with smaller lights, besides the moon, to his untutored eye of dimensions, equal to those of the sun himself. He has not yet learnt, that relative distances cannot be measured by the apparent size of the object surveyed; but in the progress of his studies, he will discover a method of measuring heights and distances, which will refute the testimony of his naked vision, and rectify the error of his eye. He cannot fail speedily to perceive, that of the nightly visitants over his head, there are two distinct classes of stars, all apparently rising from the horizon, moving in sublime grandeur and harmony from east to west, and returning from day to day to the horizon again. So deep is this deception of the human eye, that although to the searching ken of science, the error is demonstrated, beyond the shadow of a doubt, and the fact placed beyond all controversy, that the apparent rolling of the firmament from east to west, is only the rolling of the earth round her axis from west to east, yet the stubbornness of man's belief in the testimony of his senses, never acknowledges their mistake; and all mankind, the simple and the learned; the most sublimated astronomer, and the idlest school-boy, throughout their lives, continue to speak of the

rising and setting of the sun, moon and stars, as if these were the real movements of the celestial orbs, and as if the earth, on whose surface we live, was stationed in eternal repose. Ages and ages pass away, before even the discovery of this error is made, but, in the meantime, man is continually gazing at the lamps of heaven, and in the lapse of centuries, successively detects many of their real movements, the laws by which they are regulated, their dimensions, their distances from the earth and from one another, their specific gravities, and all, but the purposes of their creation. It is soon perceived, that the sun, the moon, and one of the two classes of the stars, though appearing from day to day to change their places in the celestial hemisphere, within which they are suspended, that yet, that the range of their excursive motion is confined within one narrow belt of the surrounding orb, and in the successive vicinity of one and the same portion of the clusters of stars of the second class fixed within that limited circle, while the other class of stars are apparently immoveable in the firmament, and although, moving with inconceivable velocity, yet in regions of space so remote, that the distances between them, cannot be made sensible to the human eye, so that they seem always fixed in one and the same spot of the blue expanse. They acquire thus the denomination of fixed stars. The annual revolution of the earth in her orbit round the sun, brings that luminary successively in contact, or as it is usually called, in conjunction with a succession of the same groups of stars, and while in this conjunction with them, he extinguishes, in a flood of his own splendor, all those seemingly lesser lights.

At an age, in the history of the earth, so remote, that the memory of it has vanished from the records of antiquity, the zone of the heavens, through the range of which the sun and planets appear to pass, has been divided into twelve clusters of equal dimensions, each passing in the compass of two hours, before the eyes of the beholder. With the aid of fancy, these constellations have been fashioned into the shape of animals, or men, and the imaginary circle has been denominated the zodiac. The superstition inspired in the early ages, into the soul of man, by the wonders unfolded to his vision, flies to the resort of fabulous invention, and a spiritual world of numberless gods is formed, which connects a tale of human action and suffering, with every constellation in the skies.

From the influence of the sun upon the fortunes of the earth, and of her inhabitants, the conception follows, that the stars, which revolve with him, must possess a proportion of the same influence; nor is the conjecture unnatural, that this influence of the sun, must be portentous, increased and various, modified when mingled with that of all the other stars, whose radiance, when in conjunction with him, is all absorbed in his own. A system of romance, is woven by superstition, into the annual revolution of the globe, and the labors of Hercules become the personification of the sun through the zodiac. The same process divides the year into twelve months, which were supposed to be of thirty days each, and thus, for many ages, the year was accounted to consist of 360 days. But the revolution of the moon round the earth, which constitutes the lunar months, is performed in twenty nine days, and from eight to sixteen hours. Twelve lunations are thus performed in 354 days. It required no very protracted experience, to ascertain, the want of five additional days, to the 360, which had been assumed as an approximation to the exact amount of one change of the four seasons. It became an object of intense interest, to discover a common measure, by which the respective periods of the sun and moon might be so combined, as to bring them to precisely the same relative position towards each other, and it was found to be of 223 lunations. But among the stars, which, in the course of each revolving year, the sun obliterates for a season, and then restores to a splendor next in glory to his own, is Sirius, or the dog star. He was worshipped as a God, by the Egyptian shepherds, and they watched his heliacal rising, after several weeks of concealment from his rays. From that day, they dated the commencement of their year. A uniform experience of centuries, disclosed to them, that, although the star regularly rises at the expiration of 365 days from his last previous emerging from the sun-beam, yet that one day more will be required for his re-appearance, at the end of every fourth year. Six hours then, was to be added, to complete the solar year, and the calender was reformed accordingly. But this great reformation, is comparatively of modern date, having in the Roman history been first accomplished by JULIUS CÆSAR. At the end of twelve centuries, from the time when the Jewish passover, transformed into the christian festival of Easter, by the decree of the council of Nice, in the year 325 from the birth of Christ, the pre-

cise duration of the solar year was more accurately fixed, by subtracting eleven minutes and as many seconds from the over allowance of six hours to the 365 days composing it. The Gregorian Calendar was then framed to a measurement of the solar year, consisting of 365 days, 5 hours, 48 minutes and 49 seconds, which is so near the real average time of the earth in its orbit round the sun, that there cannot be a loss of one day in less than 4000 years.

The origin of the science of Astronomy, is lost in the darkness of antiquity. It has been ascribed to an antediluvian people, inhabiting the region of Mauritania, and of whom ATLAS, the inventor of the sphere, was the king. When the race of Adam, in the progress of their degeneracy and corruptions, lost all memory of the true and only God, the Creator of the worlds, they fell into foul idolatry, surrendered themselves to all the delusions of a fiery and flighty imagination, and created numberless gods, among whom, every star had a ruling spirit. They also fancied that gifted mortals of the human family, were changed into gods, and placed among the stars. Astronomy thus became associated with false religion; and judicial Astrology, born of wild superstition, usurped the place of the genuine and legitimate science. The sun and moon were worshiped as chief, among the gods, and the fabulous invention of Greece, traced their origin to the twins of Latona, born on the Island of Delos, children of Jupiter, the father of gods and men, and sovereign of Olympus. With these attributes of power, the divinities stationed in the stars, were invested with absolute control over the fortunes and fates of every individual of the human race, and these fortunes and fates, were believed to be foreshadowed and predestined by the peculiar conjunction of certain stars, at the moment of the infant's birth. These visions of romance, were expanded and multiplied into a great, complicated system, blending together the fabrications of perverted history, the imaginations of judicial Astrology and the devoted studies of physical Astronomy. It is easy to conceive, how this amalgamation of truth and falsehood, of the most absurd forgeries of a boundless imagination, with the profound investigation of the real secrets of nature, must have obstructed the progress of the real science.— From the moment that the tillage of the earth became the occupation of man, for the subsistence and multiplication of the species, it became of transcendant importance to ascertain the precise du-

ration of the solar year, as the measure of time; and the exercise of religious worship, all adapted to the successive seasons of the year, furnished from time to time the approaches to a perfect accuracy of computation. From the lunar twelve months of three hundred and fifty-four days, to the twelve equal months of thirty days each, making three hundred and sixty, and thence to three hundred and sixty-five, the approximation was effected by the revolution of the seasons themselves. The commencement of the year was fixed at the conjunction of the full moon with the vernal equinox, and then it was, that the labors of the field commenced. The Sabbath, one day in seven, was enjoined as a holiday for religious worship and for repose and refreshment, from continual toil, and the subsequent festivals throughout the year, were adapted to the day of every new moon, and to the ingathering of the harvest at the end of the year. At the Exodus of the children of Israel from Egypt, the Passover was instituted precisely at this commencement of the year, the combined full moon and vernal equinox. These institutions were, in all probability, a portion of that learning of the Egyptians, in which Moses had been initiated, and laid the foundation of the Jewish Passover, still maintained at this day in the modified form of the Christian commemoration of the day of the resurrection of their Lord and Master from the dead. All the other religious solemnities of the year, were adapted to this, and they soon brought the demonstration, that three hundred and sixty-five days were required, to complete the revolution of the year. The additional quarter of a day, was discovered by a religious festival, not of the Hebrews, but of the Egyptians, as I have already said, by the annual heliacal rising of the dog-star. And the final retrenchment of eleven minutes and eleven seconds, from the annual six hours, was again discovered in the fact, that by the celebration of the festival of Easter, for twelve hundred years, the Julian calendar had encroached on the space of real time, the amount of ten days.

To the art of Navigation, the observation of the stars is no less tributary. But navigation itself is an art which can scarcely be said to have been known to the ancients. Whatever of adventure upon the ocean was undertaken by them, could extend to but very short distances from the sight of land. The straits of Gibraltar, by the name of the pillars of Hercules, and the Shetland Islands,

by the name of the Ultima Thule, were deemed the extremities of the earth; and less than half a century before the daring voyage of Columbus, Vasco de Gama had opened the way to India, only by doubling the Cape of Storms. The path of navigation was indeed precariously pointed out by the stars, but a beclouded sky left the mariner without a pilot or a guide, other than the land within his sight. The polarity of the magnet, with all its yet unexplained, perhaps not inexplicable wonders, was yet a secret in the bosom of the Creator, nor has it yet been more than half revealed. To what favored mortal, the whisper of Omnipotence to man was indulged, that the suspended needle would turn in sympathy to the pole, the memory of heedless or ungateful man, has not recorded; but notwithstanding the pretension that China, locked up in a dungeon as she has been for numberless ages, has been all the time possessed of this secret, without ever profiting by it, notwithstanding that in the Odyssey of Homer, a passage of ambiguous import seems to indicate, that the man of many woes, the visitant of many cities, the crafty chieftain from Ithaca to the ten years siege of Troy, had a ministering spirit to conduct him in safety over, and through the rock bound seas. The voice of authentic history has pronounced, that the Mariner's compass was invented at Amalfi, in Italy, on the shores of the Mediterranean, in the twelfth century of the Christian *Æra*.

In less than three centuries from that day, Christopher Columbus, of Genoa, sailed from the port of Palos in Spain, and spreading his sails to the breeze or the gale, plunged, in search of another passage way to India, into the Cimmerian darkness, of unknown oceans, with the polar needle for his only guide. He found not what he sought, the shores of Hindostan by a western track: but he found what he had not imagined, two intervening continents to block up his way, little inferior in extent to the whole eastern hemisphere. Upon this discovery of the polarity of the magnetic needle, it may be remarked, as upon multitudes of other occasions in the history of human sciences, what hidden links of sympathy bind them all together. Astronomy is the study of the movements of the stars, which appear suspended in the skies at immeasurable distances from the observer. To the skies, the God of nature first commands him to turn his eyes. From the daily revolution of the Earth round her axis, the monthly revolution of the

moon round the earth, and the yearly revolution of the earth and moon round the sun, a combined standard measure of time is found, uniting in harmony, the three great and indispensable divisions of days, months, and years. It is thus from the skies, that the inhabitant of the earth is provided with a measure of time, without which, the mind of man would be unconscious of its own succession of ideas, and of course unable to trace the connexion between effects and their causes, and incapable of the exercise of reason. Thus it is, that

From harmony, from heavenly harmony,
This universal frame began —

and thus it is, that the succession of thought, and the music of the spheres, is the chorus of Angels conveying to man the inspiration of the Almighty, which giveth him understanding.

The declination of the sun from the winter to the summer solstice northward, and from the summer to the winter solstice southward of the equator, was among the earliest of Astronomical observations: It cannot escape the notice of any human eye accustomed to witness, from day to day, throughout the year, the rising and the setting sun. Its cause was reserved for the discovery of the Grecian philosopher, Anaximander, the pupil of Thales, the first of the Greeks, who devoted his talents and his life, to the investigation of the mechanism of the Universe. The cause of this phenomenon is the obliquity of the ecliptic, or the angle of inclination of the plane in which the earth rolls round in her orbit, to the plane of the equator, or imaginary circle, which divides the globe into two hemispheres. From the same cause, the rising and setting of the sun, moon, and stars from day to day, is not in a perpendicular, but in a slanting direction. The arch in the firmament, daily described by the fixed stars, is, with the exception of the almost imperceptible precession of the equinoxes, always the same on any given spot of the earth—but that of the sun, moon and planets, varies in right ascension from day to day; though all except the four new discovered planets, within the range of the Zodiac. In the daily arch described by the sun, his movement is, precisely half the time he is above the horizon, ascending, and half the time descending; and at the precise point of time when he

ceases to ascend, and begins to culminate, the eye of the observer looking southward, meets an imaginary perpendicular line, crossing the zenith over his head, passing through the northern pole, and returning to its origin at the south. This is the meridian, and it is by the passage of the sun over this line, that the solar day is divided into two equal parts. The passage of the heavenly bodies over this line, is thus ascertained to a second of time, and the observation of that moment, continues to this day, to be one of the most important operations of the science. Its first result was to furnish the most simple, and most perfect instrument, for the subdivision of the day into hours, minutes and seconds; the sun dial invented by ANAXAMANDER. It is but to place a spindle in the centre of several concentric circles, so that the shadow of the spindle shall be formed by the rays of the sun. At whatever point of the circle, the point of the spindle terminates on the western side of the meridian line, in the morning, the interval between that point and the meridian will be precisely equal to a similar point eastward of the meridian, when the shadow of the spindle, lengthened by the descending sun, reaches the corresponding point of the same circle in the afternoon. The lapse of time for the shadow of the spindle to pass from the point west, to the meridian, and from the meridian, and the point east of the same circle, will be precisely the same. The morning measure, gives an unerring standard for the extension of the other; and the observer has a sliding scale, with which he can subdivide the solar day into as many equal parts, as his convenience, or his pleasure may require.

This is the principle of the Sun Dial, invented by ANAXIMANDER, and thus was obtained a perfect measure of the succession of time, from the hundredth part of a second to numbers of centuries, lost in the boundless regions of infinitude.

The fixation of the equinoctial and solstitial points follows close upon that of the meridian line, and they mark the bounds of the zodiac—and these lead to the disclosure of the distinction between the planets, which are appendages of our solar system, and the fixed stars: themselves central suns to other systems, swarming throughout the regions of space. The planets are known by their continual apparent changes of place, on the firmament, by their alternate declination, north and south of the equator and by their varying *right ascension*, always observable with the naked eye.

These few wanderers, amidst the numberless multitudes of apparent fixtures to the vault of heaven, were recognized in very early ages. The planets Mercury, Venus, Mars, Jupiter and Saturn, were successively discovered, and down to within our own age; were supposed, universally to be the only planets belonging to our system. Within the last century, however, the glazier and the musician have doubled the number of planets. In 1780, a musician, a native of Germany settled in England, by long continued observation, accidentally perceived a star of the 7th magnitude, invisible to the naked eye, which had changed its place in the interval, between two successive observations. The star had been marked in the catalogue of Flamsteed as a fixture, and since that day had performed little more than one revolution of its orbit; nor has it yet, since its discovery as a planet, completed one such revolution. The imaginary lines of the equinoxes, the solstices and the meridian were followed by two others, denominated the colures, and the armillary sphere was completed. The remarkable constellations of the zodiac, were divided into twelve signs, through each of which, the sun appears to pass in twenty-four hours. Each of these signs was historically connected with the fabulous mythology of Greece and Rome; and each star was the personification, or the abode of some one of the divinities of the heathen.

But, besides the daily occurring phenomena of the movements of the sun, moon, planets and fixed stars, at all times, with a clear sky exposed to the eye, and stimulating to reflection, there are occasional phenomena happening; at distant, and unequal distances of time,—striking to the eye, and terrific to the imagination. The first impression of the daily phenomena, having been that the stars themselves were animated, immortal beings, invested with indefinite power over the lives and fortunes of men, the incessant repetition of the same appearances, familiarized the minds of men to them, till they ceased to excite in any bosom, the sensation of hope or of fear. But it was not so with the unfrequent and unforeseen appearance of eclipses, and of comets, which never exhibited their forms in the sky, without exciting panic, terrors and agonizing distress. The eclipses of the sun and moon, usually being visible two or three times in the course of every year, lose their alarming character in proportion as their appearances multiply, and the enquiries into their causes, are multiplied and pursued

by minds of various intellectual energies. The eclipses of the sun are occasioned by the passage of the moon between him and the earth,—the opaque body of the moon, intercepting the rays of the sun in their passage to the earth, and the eye of the beholder resting upon the dark body of the moon. The eclipses of the moon are caused by the passage of the earth between her and the sun. The eye rests on the body of the moon, covered and darkened by the shadow of the earth, falling upon the moon in a tapering cone from the two sides of the globe, and alighting upon her disk. In both cases, the eye rests upon the body of the moon, in the solar eclipse, totally black, by the total privation of the sun's effulgence—in the lunar eclipse overshadowed by the shade of the earth herself, extended like the frustum of a cone, sometimes over the whole of the moon's disk. In a total eclipse of the sun the moon covers his whole disk, and at his place is seen nothing, but a black spot, covering his whole disk, and looking like a blot on the fair face of heaven. The eclipse of the moon always happens at the full, and with her illuminated side turns towards the earth. The light of the sun is not extinguished, but the shadow falls on her luminous disk with a dark smoky color, seldom covering her whole disk. A very small portion of the eclipses, whether of the sun or of the moon are total, and the appearances of partial eclipses are infinitely varied. Terror and consternation spread universally, at these sports of nature with the passions of man, while their causes remain unrevealed. But when once disclosed they are found to be among the simplest and most harmless operations of nature. The interposition of an opaque body, between the light of a lamp, and any object upon which it sheds its beams, produces all the apparitions visible in these planetary conjunctions and oppositions, and reveals the whole theory of solar and lunar eclipses. By continual persevering observation of the skies, the discovery cannot fail to be made, and when the measure of time, comes once to be made, and the periodical revolutions of the sun moon and planets, combined together, are so perfectly ascertained it is one of the easiest tasks of the Astronomer, to predict within a minute of time, when any given eclipse of the sun or moon will take place, for thousands of years to come: and there are memorable instances in history, of the use made by a nation possessed of this secret, to subdue their enemies uninstructed of the

same knowledge. That it was known to the ancient Chaldeans, is known by the calculations of eclipses found by CALLISTHENES at Babylon, and transmitted to ALEXANDER, embracing a period backward in the lapse of time, of more than two thousand years. The annexation and adherence of comets to our solar system, is a secret among the more recondite mysteries of nature; and signalized by exhibitions to the vision of man, still more terrific and astounding than those of the eclipses. The intervals between the apparitions of those fiery visitors from infinite space, are longer and more frequent than of eclipses. The phenomena attending the appearance of comets, are of occurrence so rare, their movements are so irregular, and the fiery trail that they draw behind them is so terrific, that their existence, and the laws by which they are governed as part of our system, are far less accessible to the observation of the human eye, than the revolutions of the planets. Two centuries have not yet elapsed since the discovery made by Dr. HALLEY; that the comets have, like the planets, stated periods of revolution in their elliptical orbits round the sun. But their numbers, and the extent of their range over infinite space in the firmament, are not yet known, nor likely to be so, for centuries to come. The continual variations from day to day, of the declinations and right ascension of the planets, indicating movements precisely similar to those of the sun and moon, soon lead to the conclusion that they form a part of one system. The planets Mercury, Venus, Mars, Jupiter and Saturn, form together a combination of contemporaneous movements, which it requires ages of continuous observation to disentangle. The earth herself with her attendant satellite, the moon, is one of the planets; though being the abode of the observer, and her surface the station from which he observed, he has not the same elements for calculation of her movements as of the rest. It is soon found that the orbits of Mercury and Venus, are included within that of the earth, and those of Mars, Jupiter and Saturn, at proportionate lengthened distances from the sun, as the distance of each planet increases its orbit, enlarges and encloses within itself the orbits of all the planets nearer to the sun than itself. Thus, as the orbit of the earth includes within itself those of Venus and Mercury, and is included within those of Mars, Jupiter and Saturn, the simultaneous observation of all these movements, runs into a scrall inexplicable to all but the most intense

application and perseverance of the human intellect. The revolution of the planet Mercury round the sun, is performed in the space of three months—that of the earth in one year—that of Jupiter in twelve, and that of Saturn in thirty years. All these discoveries were made by the Astronomers of antiquity. It was reserved for the vision of an observer of the eighteenth century, to discover the planet now called Uranus, the revolution of which, in its orbit is performed, in 80 years. Since which, four other planets have been discovered within the region, between Mars and Jupiter. Of these last four planets, there is this remarkable peculiarity, that their orbits, much interlocked with each other, extend beyond the belt of the zodiac. The daily variation of the declination and right ascension of the sun and moon, are so conspicuous to the eye of every beholder, that they cannot escape notice for any length of time. The star planets exhibit varieties of movement of the same character, less exposed to the naked vision; but being objects of so much smaller apparant size, are not so easily or so soon detected; but are ultimately recognized as parts of the same organized, complicated machine. The process of Astronomical discovery, is uniform in its operation. The object is first perceived as it presents itself to the eye. When that is sufficiently fixed, the reasoning faculty commences the search for causes, and then the inventive powers are put in requisition, for the application to useful purposes, of the discoveries that have been made. In observing the revolutions of the planets in their orbits, the optical delusions are multiplied, the movements themselves are complicated, consisting of the movement of the planet itself, combined with the simultaneous movement of the earth, and the alternate conjunction and opposition of the sun; and they give to the movement of the planet, the deceptive appearance of irregular motion; sometimes direct, at others retrograde—now slackening, and now accelerated, and occasionally stationary—but patient and persevering observation, discloses all the thread of the texture,

Untwisting all the ties, that bind
The hidden soul of harmony.

Whatever of Astronomical science may have been acquired by
the earliest Asiatic and African monarchies, which succeeded the

confusion of Babel, the first schools of philosophy in Greece, are known to have originated about six hundred and fifty years before the Christian era. THALES of Miletus, is the first of the Grecian sages known to posterity, as having been versed in the science of Astronomy, and as having contributed to its progress. He was cotemporary with the prophet JEREMIAH, and with king AHAZ, whose sun dial was the subject of a miracle, which proves beyond all question, that the use of the dial was familiarly known, and had been so for ages, in the kingdom of Judah. The Argonautic expedition is the first event in Grecian history, showing the existence of a confederated government, carrying with it an art of navigation, and a science of Astronomy. THALES was the first of the wise men of Greece, and is, also, the first of Grecian Astronomers. He acquired in Egypt, all the astronomical knowledge that he possessed; and is said to have taught the Egyptian priests to measure the height of the pyramids, by the length of their shadows. He founded the Ionian school of philosophy. He taught that the stars are of the same substance with the Earth, but kindled into a flame. That the light of the moon is but borrowed from the sun. That she causes the eclipses of the sun, by interposing between the sun and the moon, and that the moon is eclipsed by the shadow of the earth. He taught that the earth was a globe, and divided into five circles, the arctic and antarctic, the two tropics and the equator. The obliquity of the ecliptic, and the perpendicular of the meridian, were also familiar to his school. The circles of the sphere are a mechanical invention, to describe the regions of the earth, and corresponding regions of the heavens; the forms of the constellations, and the distribution of the fixed stars. Yet two hundred and fifty years after his death, the first of the Greek historians, HERODOTUS, in speaking of a solar eclipse, says, that the sun abandoned his place in the skies, and left it to night. THALES is said to have been the first man who foretold a solar eclipse. It is said, also, that he measured the diameter of the sun.

His successor in the Ionian school, ANAXIMANDER, was the inventor of geographical maps. And he was the first, who held that the sun, was a ball of fire, with the earth revolving round it. He believed, also, in the plurality of worlds; and held, also, that the moon receives her light from reflection, from the sun, but has,

besides, a feebler light of her own. ANAXIMANDER was succeeded by ANAXIMENES, of the same city, and said to have been, the inventor of the sun-dial. But, this is not possible, for it has been remarked, that the sun-dial was familiarly known in the days of AHAAZ, who lived 200 years before ANAXIMENES. There is no doubt, that the dial was a Chaldean invention, and it is highly probable, that the pyramids, were among other uses, intended for dials, on a larger scale.

ANAXAGORAS, of Clazomene, was the disciple and successor of ANAXIMENES. Like all the Grecian philosophers, in speculating upon the visible objects of the Creation, in eager pursuit of the causes of the natural phenomena exposed to the senses, whenever the fact did not appear sufficient for its own explanation, they resorted to conjecture, and they formed theories so wild, and extravagant, that we now wonder how they could ever have entered into the heads of rational men. ANAXAGORAS was so much absorbed in the contemplation of the heavens, that he neglected his worldly concerns; that, upon being asked, whether he had no time for his country, he pointed to the sky, and exclaimed, — *there* is my country. Yet, ANAXAGORAS, from the single fact, of the falling of a stone from the sky, a phenomenon of repeated, and well authenticated occurrence, both in the old and in the new world, imagined that the whole firmament was one mass of stone. That the stars, were small parcels of the substance of the earth, evaporated from the agency of fire, and suspended, as inflamed globes, in the atmosphere. He maintained, also, that the sun was a blazing torch, larger than the Peloponessus, and that the moon was larger than the earth.

For these, and other profound and ingenious speculations, upon the nature of matter, and of mind, ANAXAGORAS was, as usual, persecuted. He was a Unitarian, and declared his opinion, that there was but one God. He taught the true causes of eclipses, by the interposition of the moon between the earth and the sun, and of the interposition of the earth between the sun and the moon. He was accused of impiety to the Gods, for believing that there was but one God, and for affirming, what is now universally known to be true, that eclipse is nothing more than the interposition of an opaque body, between a luminary and the object on which it shines. He was accused of impiety to the Gods—tried

convicted, and condemned to death: which sentence, at the suggestion of PERICLES, was commuted for banishment.

The opinions of ANAXAGORAS, upon the materiality, size, distance, and relative magnitude of the sun, moon, and stars, illustrate the progress of the science of Astronomy, in enlarging the compass of the human mind, as well as the immensity of the material universe. That the mind of ANAXAGORAS was of the highest order of human intellect, is evident from the nature of the subjects on which it habitually, perseveringly and passionately dwelt.—The mind, capable of rising, by its native energies, to the conception of one, and only one Supreme Ruler of the universe—capable of ascending to the idea of its own ultimate destination in the skies, was of no ordinary stamp—and yet, how infinitely small, was the range of its contemplations, when we find it estimating the mass of matter in the sun, as comparable, in volume, to that of the Peloponnessus; the moon larger than the earth, and the stars as parcels of this terrestrial globe itself! When we see the first Herschel, bring within the field of one glance of his telescope, 36,000 solar systems in a nebulæ, into what nothing, sink the estimates of ANAXAGORAS.

The Ionian school, was transferred by ANAXAGORAS and ARCHELAUS, from Miletus to Athens, while, about the same time, another school of philosophy, was founded by PYTHAGORAS. This is one of the most remarkable personages of all antiquity, and his principal residence having been at Crotona, his school was known by the name of the Italic. His system of philosophy, like that of THALES, embraced the principles of morals, no less than the science of physical nature. He had, before attempting to introduce his institution, established a reputation for wisdom and virtue, so transcendent, that his moral instructions were issued, in the form of self-evident truths, and indisputable commands, so that, if upon any precept given by him, any question was ever made, the answer of his disciples,—“*He said it,*” silenced all objections. In our own times, in all the intercourse of society, there is a freedom of thought, and of speech, held so inviolable, that we find it difficult to believe that such despotic authority of intellect, should ever have been established, and submitted to, between man and man, otherwise equals. PYTHAGORAS, was a native of the Island of Sidon, the son of a sculptor, of Samos, and bred to the profession

of a common wrestler. But, in attendance upon the discourses of PHERACYCLES, on the immortality of the soul, his own spirit took wing to the future world, and he devoted his life to philosophy. Morals, Politics, Mathematics, Astronomy, Natural History, and domestic economy, all were included in his school of philosophy, for the very name of which, the world is indebted to him. He modestly disclaimed the name of sage, or wise man, which the distinguished men of learning, had assumed, before him, and called himself, only a lover of wisdom. In every department of intellectual improvement, no individual of the human race, without the bounds of divine inspiration, ever bestowed more rays of light, upon the soul of his fellow creature, man, than PYTHAGORAS. His golden verses, are rules of life, as admirable at this day, as when first composed. His rules of justice, and mercy, and of sympathy with the human race, approach as near to Christian perfection, as ever had been attained before the advent of the Messiah. He was the discoverer of that mathematical theorem, the foundation of trigonometry, navigation; the mensuration of heights and distances—I might almost say, of all mathematics—a discovery not made by accident, or mere good fortune; but, wrought out with the most elaborate mental exertions, and for which, when accomplished, he is said to have exclaimed,—I have found it: and sacrificed a hecatomb to the Gods. The immense stride in the advancement of the science of Astronomy, by this discovery between the sides of a right-angled triangle, can scarcely be conceived; but, PYTHAGORAS is further entitled to the credit, of having given the first hint of the Copernican system, now universally admitted, that the earth revolves round the sun.

The next most renowned Grecian contributor, to the science of Astronomy, was METON, the calculator, who invented the cycle of 19 years, which bears his name, and is familiar to all our almanacs, under the name of golden number. It rests upon the assumption, that, 19 solar years, are in time, precisely equal to 235 lunar months, which is correct within a space of two hours. METON presented the tables, and an explanation of his cycle, at the olympic games, of Greece, 432 years before Christ; it was immediately accepted, and the first cycle commenced with that year. It has continued, to the present time, and the golden number of the present year, is 1.

The age of SOCRATES, and PLATO, followed close upon that of

METON, and, it is generally believed, that SOCRATES, by confining his philosophical investigations to mind, and morals, rather discouraged, than promoted, the application of the faculties of the soul, to the phenomena of physical nature. A similar prejudice has prevailed among many of the eminent teachers of mankind, from that time to the present, whether, because the study of physical nature, combined with that of the mathematics (and, without this combination, nothing useful to mankind can ever be accomplished by the study,) necessarily requires more painful and toilsome exercise of the intellectual faculties, than speculations upon morals, religion, politics, and the sports of imagination; or, whether, in these studies, there is something more congenial to the nature of a being; compounded of perishable and immortal elements, the philosophers of associated man, have found more favor with their pupils, than the searchers into causes, necessarily leading up to the first cause, impenetrable to human search. The vulgar fable of the Astronomer, who, in gazing upon the stars, stumbles into a ditch, though, probably, first devised only to deride the devotion of weak and superstitious minds, to the absurd and baseless visions of Astrology, has an unfortunate tendency, to deter the inclinations of the young, from the sublimest and the most useful of all contemplations, to the meditative and energetic mind,—the structure of that universe, of which itself is an imperishable, though an infinitely diminutive atom. The poet, who sang,—the proper study of mankind, is *man*, narrowed down the faculties of the human soul to a nut-shell. Man, is, no doubt, the proper study of mankind,—but, so is nature—So is that world, in which he is placed, in probation, with rights to enjoy, and duties to fulfil—So is that Being, all wise, all good, all powerful, his creator, and his judge—So is that firmament, over his head—So is that earth, under his feet—So is that atmosphere, which is his breath of life—So are those waters, over which he must learn to float, but in which he cannot live—So are those animal, vegetable, and mineral realms of nature, given him by the bounty of his Maker, for food and raiment, for strength, beauty, and grace.—All, all, are studies for mankind, as proper, and as necessary, as man himself.

And such, no doubt, was the sentiment of SOCRATES, and of PLATO. We know, that it was in the school of PLATO, that the Greeks learnt to trace the causes of the celestial phenomena; though

his own conjectures of those causes, the cycle and epicycle, orb in orb, were erroneous. His friend, EUDOXUS, like himself, sought for learning among the priests of Egypt. He learnt, also, from the Chaldeans, and, although he made no discoveries himself, he had the merit of separating the real, from the spurious science, and of devoting himself to the study of Astronomy, while he rejected, and spurned, the imposture of Astrology.

He was followed by ARISTOTLE, PYTHEAS, and the Alexandrian school. EUDEMUS, and THEOPHRASTUS, wrote each a history of Astronomy, but neither of those works has been preserved from the scythe of Time. The poem of ARATUS, on the phenomena of the heavens, more fortunate, has not only survived, but has enjoyed the glorious privilege, of two several translations, into Latin verse; by two of the most illustrious names of Republican and Imperial Rome—by CICERO, and by GERMANIAN CÆSAR. ARATUS was the first, who gave a new charm to the study of Astronomy, by connecting it with the fascinating beauties, and irresistible charms of poetry. He lived in the age of that pattern of monarchs, patron of literature, science, and the liberal arts, PTOLEMY PHILADELPHUS. His *museum*, the first great establishment founded by royal munificence, for the cultivation of mind, contributed more than any other institution, of antiquity, to the improvement of mankind, and the elevation of the human character. There it was, that HIPPARCHUS laid the foundations of the modern sciences of Astronomy and of Geography—The invention of the armillary sphere—The first catalogue of the stars—The discovery of the precession of the equinoxes; and the calculation in advance, of the eclipses of six hundred years, are in the history of Astronomy, achievements for which the men of all after ages, are indebted to HIPPARCHUS. He flourished, in the interval between 160 and 125 years before Christ, and the next great luminary of the Alexandrian school, was PTOLEMY, not of the royal race of that name, but of a far brighter name, as the author of that system of Astronomy, denominated, many centuries after, by its Arabian translators, the *Almagest*, or *great work*, by which it is known to this day. He was born in Ptolemais, in Egypt; his observations at Alexandria, were made under the reigns of the Roman Emperors, ADRIAN and ANTONINUS PIUS, from the year 125 to 139, of the Christian era; 250 years *had*, of course, elapsed, since the Alexandrian school

had been illustrated by the labors of HIPPARCHUS. During that interval, the reformation of the Roman Calendar, by JULIUS CÆSAR, the purest and most glorious of the titles of that heroic monster, to renown, had been established. The measurement of time, by the combined diurnal rotation of the earth upon her axis, and the annual revolution round the sun, is the only certain regulator of human history, of religious devotion and of domestic life. The first Roman year of NUMA, was the lunar year of 354 days. It had been successively altered to twelve equal months, of thirty days, and to the subsequent addition of five supplementary days. It had long been discovered, that the solar year, consisted of a fragment of a day more than 365; and, in the approximation to the real fact, one quarter of a day, or one day in four years, had been assumed as the addition necessary to be made, to equalize the year of the Calendar with the equation of time. Many years, and not seldom, many ages, elapse, after the secrets of nature have been detected by the ingenuity, industry, and perseverance of man, before he avails himself of them for the improvement of his own condition. So it was, with the Roman Calendar, till the Julian reform. It answered its purposes for 1500 years. Centuries before the expiration of that period, it had been ascertained that the addition of six hours a year to the 365 days, was too long for the natural year. The Calendar was again reformed, by Pope GREGORY, the 13th, to restore the true scriptural day, for the celebration of the resurrection of the Saviour. Yet, such was the protestant prejudice, against this most salutary and useful improvement, that the learned, ingenious, and generous nation of which we were then members, resisted its establishment until beyond the middle of the last century; and the Greek church, of the immense Empire of Russia, resists its introduction even to this day; preferring to celebrate the most solemn of their religious festivals—that of the resurrection of the dead, on a day notoriously different from that prescribed by the Saviour himself, rather than adopt the decree issued by the supreme head of a sister church, followers of the same Lord and Master.

The mind of JULIUS CÆSAR, then, enlarged, comprehensive, liberal in the exercise of power, then not acquired by crime, appropriated to the benefit of the Roman world, in their measurement of time, the discoveries of the Grecian school of Alexandria;

but the Romans, themselves, made no discoveries in Astronomy. HIPPARCHUS, was the first great luminary, of the Alexandrian school. PTOLEMY, was the second and last. Between them, they constructed a theory of the universe; a system of created nature; founded, indeed, upon that optical illusion, which first arrests the enquiries of man, into the mechanism of the world around him, but which was destined to vanish, in process of time, before the persevering searching of a future age. In contemplating that stupendous, apparent revolution of the whole firmament of heaven round the earth, performed day after day, under his eye, the royal psalmist of Judea, bursts forth into a shout of glory, to the Creator, and particularly describes the circuit of the sun, from his rising in the east, to his descent beneath the horizon, in the opposite quarter of the sky. But human observation, progresses to a system, by detecting the phenomena of nature, one by one. They accumulate, in a course of ages, and then range themselves into a system. Neither HIPPARCHUS, nor PTOLEMY, disciplined their souls to the hardihood of setting at defiance, the testimony of their eyes, and of assuming, that the appearance of the rotation of the firmament, was only the rotation of the earth herself round her axis; but the precession of the equinoxes, the obliquity of the ecliptic, the double system of movements, regulating the different movements of the fixed stars, and the planets, and even the parallaxes of the bodies congregated in the solar system, had been discovered by or before HIPPARCHUS, and were now organized into a system by PTOLEMY. Trusting to the optical delusion of the eye, he assumed, that the earth was at rest—the centre of the universe, around which, all the heavenly bodies daily revolved—but the relative positions, movements, and distances of the sun, moon, and the planets Mercury, Venus, Mars, Jupiter and Saturn had been calculated and made known by HIPPARCHUS, and were now wrought up into a celestial mechanism, by PTOLEMY. That the material substance of all these bodies, was spherical, had been ascertained, by long contested and multiplied demonstrations, and the natural conclusion, that their revolutions round the orbits was also necessarily circular, was another error, that nothing less than the lapse of many centuries, and the minds of TYCHO, of Kepler, and of NEWTON, could redeem.

The Science of Astronomy, is the intercourse of immortal man

with the universe. The mind, accustomed to contemplate with inquisitive and persevering research, the wonders of the creation, enlarges itself by the constant exercise of its powers, as steel is at once sharpened and brightened, by continual attrition. The genius of **PTOLEMY**, was not confined to communion with the stars. Besides, that common chain, which unites, as with links of adamant, the whole circle of the sciences, and the liberal arts, there is a still more close and intimate connection of Astronomy with Geography, and with optics, and the various branches of the Mathematics, than with the rest. The pillars of the fame of **PTOLEMY**, repose not less upon his system of Geography, than upon his Astronomy. He was the author, also, of a treatise of optics, which, although known to have been extant in the eleventh and thirteenth centuries, perished in the Gothic barbarism of the middle ages. It is easy to perceive, (says the profound and ill-starred **BAILLY**,) that few men have labored so much, and upon more important objects, than **PTOLEMY**. He embraced chronology, music, optics, and dialing, after ruling as the legislator of Astronomy and Geography. He is said to have died, at the age of 78 years. And a saying of his, has been recorded, characteristic of that conscious superiority of genius, over the conventional greatness of human institution, which belongs to the benefactors of mankind: On being invited to the table of a monarch, he declined the honor, observing, that kings, like paintings, are made to be seen from a distance.

The glory of the Alexandrian school, finished with **PTOLEMY**. His system became the scientific creed of the world, and, as it was founded on a basis of error, its semblance of truth itself, arrested for a thousand years, the progress of the human mind, towards the real truth. Assuming, that the earth was the centre of the solar system, round which all the heavenly bodies revolved in circular orbits, the movements of the planets in different directions, sometimes from east to west, at others from west to east, and then, again, stationary, became inexplicable to the theory of a simple and steady movement in a circular orbit, and required an imaginary complicated machinery of cycle and epicycle, orb in orb, supposing a separate organization of the motions for each separate planet, without connecting link, or observation of a single principle, impelling them all.

Then came the conquest of the Arabian imposter, and the burn-

ing, by his ignorant and barbarian Lieutenant Omar, of that magnificent library of Alexandria. But the science scornfully rejected by the fanaticism of a new religion, resumed again her grasp upon the soul of man, by the lure of superstition. Till the age of Mahomet, the Arabian Astronomers had been of the Chaldean and Egyptian schools. The stars had been their Gods. Sirius, Aldebaran, Canopus had been the objects of their worship. The doctrine preached by Mahomet and his followers, consisted of two plain clear and intelligible principles. The unity of God, and the prophetic mission of Mahomet. So irresistably did the first of these principles, once proclaimed, seize hold of the avenues to the heart, that it carried down the second with it. There is but one God, and Mahomet is his prophet, was the triumphant shout of victory, and at the same time the whole creed of the warrior Muselman, from Mecca to Tontarabia. The stars ceased to be Gods. The Syrian, the Egyptian, and the Greek and Roman deities all perished in the conflagration of the Alexandrian library, before the unity of God and the prophetic mission of the Camel driver. But from their ashes sprung up a new swarm of spiritual rulers of the destinies of man. The stars were still instinct with life, with occult mysterious agency in waving the wand of fate over the lives and fortunes of the only rational tenant of this terrestrial Globe.

We must remember, that of the genuine and the spurious science, of the chaste matron and the painted harlot; the parantage is one and the same. They are sisters of one and the same descent, and their family features are so much alike, that it requires almost the eye of intuition to distinguish the virtue from the vice. The study of Astronomy and of Astrology both, consist of a mere comparison between the relative location in infinite space; and movements of the heavenly bodies in their aspects towards one another. The firmament consists of innumerable multitudes of these shining bodies suspended in the immensity of space, moving in silent harmony, and incomprehensible order, day after day, over the head of man, from the cradle to the grave. They are exposed to the perception of only one of his senses, the eye—inaccessible to all the rest. What they are, whence they came, where they are going; and how they exist, suspended upon nothing—he knows *not*, but is left to discover, by the combining and discriminating powers of his intellect. None of the machinery which he

invents to assist him in his researches, exist in nature. They are round, as they appear to his eye; the sun and moon, with disks of considerable dimensions; the largest of the stars, scarcely bigger than the head of a pin, and the rest tapering off into graduated magnitude, to a barely discernible point, and still swarming, as the power of vision fails, but all apparently round. The earth on which he dwells, never appears to him as one of these stars of the firmament; till after ages upon ages of observation, he finds she is one of the smallest of them. A satellite of the sun, and still round; spherical, though not a perfect sphere. To study the nature of these immeasurable masses, he must divide them into parts. He constructs then, artificial globes, and divides them into circles of latitude and longitude of three hundred and sixty degrees, subdivided into minutes and seconds. He provides them with poles, with an equator, a zodiac, and an ecliptic, a zenith, and a nadir's equinoctial and solstitial points; polar circles, tropics and colures. Of all this, there is nothing in nature, neither the globe of earth, nor the firmament of heaven; they are merely human inventions, to assist the observations of man in his searches after physical truth. But all this machinery is equally used by the Astronomer and the Astrologer. And as they compare the relative positions of the heavenly bodies, in their complicated motions, the bodies which cross each other's paths, appear in reference to each other, in different aspects, known alike to the Astronomer and the Astrologer, as in conjunction, or in opposition, in quadrature or in trine.

The various, different, and in many respects, opposite motives which have impelled mankind to the study of the stars, have had a singular effect in complicating and confounding the nomenclature of the science. Religion, idolatry, superstition, curiosity, the thirst for knowledge, the passion for penetrating into the secrets of nature; the warfare of the huntsman by night and by day, against the beasts of the forest and of the field. The meditations of the shepherd in the custody and wanderings of his flocks and herds, the influence of the revolving seasons of the year, and the successive garniture of the firmament, upon the labors of the husbandman, upon the seed time and the harvest, the blooming of flowers, and the ripening of the vintage, the polar pilot of the navigator, and the mysterious magnet of the mariner— all in harmonious ac-

tion, stimulate the child of earth and of heaven, to interrogate the dazzling splendors of the sky, to reveal to him the laws of their own existence. He sees his own comforts, his own happiness, his own existence identified with theirs. He sees the Creator in creation, and calls upon creation to declare the glory of the Creator. When PYTHAGORAS the philosopher of the Grecian schools, conceived that more than earthly idea of the music of the spheres, when the darling dramatist of nature, inspires the lips of his lover on the moonlight green, with the beloved of his soul to say to her

Sit JESSICA—Look how the floor of heaven,
Is thick inlaid with patterns of bright gold.
There's not the smallest orb which thou beholdest,
But in his motion, like an angel sings,
Still choring, to the young eyed cherubim.

Oh! who is the one with a heart, but almost wishes to cast off this muddy vesture of decay, to be admitted to the joy of listening to the celestial harmony.

As the motives in the mind of man, urging him to the study of the stars, are so powerful, and so multifarious, so are the modes of pursuing this study, equally numerous and diversified. The sun, the moon, and the two classes, the wandering and the sedentary stars, so seemingly alike to the first inspection; so utterly and increasingly unlike on close, and closer examination; the special search for discovery of each individual planet, and for the laws of their existence and movements, whether common to them all, or separate to each individual; the burning splendor of Mercury, so minute, as to be seldom visible to the naked eye, yet so dazzling bright when seen; the lunar phases of Venus, most brilliant in her quarter, and inextinguishable, even in the presence of the sun. The special privilege of these two planets to pass occasionally, though rarely, over the face of the sun—in the sight of man, and at times, predicted to the fraction of a second by him; the rubicund visage, and snow bleached pole of Mars; the belts and satellites of Jupiter; the satellites and rings of Saturn; the planetary character, and satellites of Uranus, mistaken by FLAMSTEED for a fixed star of the sixth magnitude, and finally, the quadruple fragment of one large planet; which, to preserve the symmetry of the solar system, should have been stationed between Mars and

Jupiter,—all the fragments discovered in that region, but ranging in eccentric orbits, beyond the bounds of the ecliptic, in which the sun, and all the other discovered planets are confined; all these have been, and yet, are made the special subjects of keen and acute observation, of stubborn and incessant research, and of elaborate calculation. Then the world of comets, travellers, perhaps, into the regions of more than one solar system, and in their parabolic orbits, passing successively from one to another, a theme but recently, and yet imperfectly opened to exploring enquiry. To all this, has been added of late years, with the new auxiliary assistance of stupendously increased magnifying glasses, indefatigable and unceasing labors, to enumerate, and classify, and publish catalogues of the fixed stars. Of more than one of them parallaxes, have been at length ascertained, and distances of almost inexpressible numbers, have been measured and recorded; double, triple and quadruple stars, having separate movements of mutual connection with each other, have been detected, and allured to further discovery. And while the star gazers, from Observatories, multiplying in the four quarters of the globe, almost in proportion to the multiplication of the new discovered stars themselves, force upon the mind of man, the conclusion, that every new accession to his knowledge, acquired by his unceasing and untiring efforts, are but spurs to stimulate the ever restless activity of his intellectual powers, for the acquisition of more. When, and how, and by whom the zodiac, as it is now exhibited in all our celestial maps, and all our annual almanacs, was invented, no effort of learning, has yet been able to discover. Its origin is undoubtedly fabulous, connected with the whole system of the mythology of Greece, with the twelve labors of Hercules, the expedition of the Argonauts to Colchis, for the golden fleece; the genealogy of Jupiter, Neptune and Pluto, their common parent Saturn, and the final solution of the whole system, in the allegorical impersonation of heaven and earth. Here Astronomy, and Astrology, idolatry and superstition, agriculture and navigation, all march hand in hand, turning history into romance, religion into falsehood; the cultivation of the earth, and the navigation of the seas into fraudulent imposture. By what magical incantation, the belief of this system could be imposed upon whole nations of men, imagination can scarcely conceive. An imaginary belt is cast round the portion of the hea-

vens, within which, the solar system revolves. This belt is divided into twelve partitions, each embracing thirty degrees of the spherical circumference. Within each of these partitions, clusters of stars, as they are visible in the sky, are gathered as into one community; and over each of them, the figure of an earthly animal is stamped, covering the whole constellation, but bearing no sort of resemblance to it. The very positions, and attitudes of the animals are painted on the celestial atlas, names are given to all the brightest of the stars, and now, at least three thousand years after this uncouth fiction was first palmed upon the credulity of mankind, we find it imposed upon us still, and we cannot learn to recognize the bright stars of heaven in the path of the sun, without painting them to the mind's eye, on the horns of a reposing ram, in the eye of a raging bull, on the foreheads of a pair of twin children, and in the fantastic and incoherent imagery of animals, wild and tame, of earth, air, fire and water, jumbled together, as if to resolve the created universe, into its primitive elemental chaos. Nor is this wild, and scarcely conceivable confusion yet exhausted. When the worship of idols, had thus insinuated itself into communion with the study of Astronomy, the population of the zodiac was extended over the whole firmament. The chief of the gods, Jupiter, and even the inferior idols of OLYMPUS, were invested with the prerogative, of placing favorite mortals to seats of honor in the heavens; and thus, not only HERCULES and PERSEUS, but ADONIS and NARCISSUS and DAPHNE, and NIOBE and her daughters, and multitudes of others, not more meritorious, rose to be dignitaries in the skies; till not only the hair of BERNICE, became a constellation, and the infamous ANTINOUS, a star of resplendent magnitude. To crown this infatuation of besotted learning, modern Astronomers, impelled by usurping vanity or base adulation, have assumed the presumption of placing among the stars, not only the shield of SOBIESKY, and the crown of the Prussian FREDERIC, with the sceptre of BRANDENBURG, but have cast to the hunting dogs, the rotten heart of CHARLES the first. The printing press, the electrical apparatus, and the air pump, may be better entitled to this symbol of immortality, but their intrusion upon this, already overcharged canvas, only adds to its unnatural complication, and encumbers the study with supernumerary difficulties and obstructions.

The cultivation of Astronomy, by the Arabians of the middle ages, during the learned period of their caliphs HAROUN-AL-RASCHID, ALMANZOR and ALMAMON, added little or nothing to the progress of the science. They preserved it from decay by their translation of the great work of PTOLEMY, and by their diligent enumeration of the stars, and their assiduity in giving them names. It is said that no nation has ever given so many names to the stars; but even that, is not without its inconveniencies to the modern student of Astronomy. Whoever is conversant with the celestial charts or globes, finds himself embarrassed with double and treble systems of notation. With Greek, Latin and Arabic names, all different, but affixed to the same stars—with letters of the Greek, Roman alphabets, often added to their names, and in many cases, the same Arabic names given to several stars in different Constellations.

Happy, said the greatest of the Roman poets of the Augustan age, happy the man who has been able to ascertain the *causes* of things. To trace the causes of things, is, of all the animal creation, the exclusive propensity, and faculty of man. He is the only animated being privileged to enquire into causes. Happy, then, must he be, when indulgent nature condescends to answer his enquiries. Of the antediluvian study of Astronomy, no record is left; but from the time of the dispersion of mankind, from the plain of Sennaar, the study of Astronomy, and the search for the causes of its phenomena, have been unremitting. In the obscurity of remote antiquity, all that we can discern is, that Astronomy, Astrology, and the Pantheon of Paganism rose and flourished together. With the first glimpse of Astronomy, which has come down to us, are associated all the gods of the Greeks, long settled upon their thrones in the stars. The zodiac was already peopled, with its twelve signs and constellations, and the only indication we have of the time when it was established, is the fact, that it fixed the point of the vernal equinox, at the first degree of the constellation of the ram. THALES and PYTHAGORAS, the founders of the Ionian and Italian schools of philosophy, are the first who appear to have made the study of the stars, a subject of philosophical enquiry, to trace the *causes* of things; but the gods had been settled on Mount Olympus, long before the time of HOMER, who lived, and whose epic poems had been composed at

least five hundred years before THALES or PYTHAGORAS were born. The zodiac itself is an imaginary bandage of twelve successive clusters of stars, marking in the heavens the annual apparent path of the sun, but the real path of the earth; but what ages of successive observations, must have passed away before those successive groups of stars could have been gathered into conventional communities, stamped with the images of certain animals, and committed to the custody of certain deities, before they could be recognized and worshiped as gods.

With every sign of the zodiac, with every one of the planets, and with all the remarkable constellations of the northern hemisphere, there was connected a historical fable and traditional biography, of men, who had made themselves conspicuous for good or evil, during their lives, and who were worshiped as gods, or doomed to Tartarus for their crimes after death. The study of the stars, then, was a whimsically compounded system of religion, of real and fabulous history, and of Astronomy, of which the metamorphoses of Ovid are, perhaps, the most characteristic exponents. The first attempts to separate these most incongruous and incoherent elements of philosophical enquiry, superstition and history, were made by THALES and PYTHAGORAS, and they appear to have been, both by different ways, on the real track in their search for the detection of causes, and the discovery of truth. But the first and greatest obstacle to the progress of that study, comes from superstition, which, at that stage of human society is identical with religion. THALES was the first of philosophers, that is, of searchers for that happiness, which the Mantuan bard avers flows from ascertaining the causes of things.

But the worship of idols, is the first great error of man, in the state of nature. His unassisted mind has not energy to conceive the foundation of all truth, that there is one, and only one God, the Creator, and the ruler of the Universe: Bereft of that divine instructor, man sees in every thing around him, the necessity of a Creator, but sees not, that there is, and can be but one. In contemplating the stars, he believes that to every one of them, there is a separate creator, and from the moment that he admits a plurality of gods, he believes them all invested with absolute power, each with his separate jurisdiction, all constituted with human passions, good and bad; and all exercising a capricious and vin-

dictive power, over the fortunes and destinies of mankind. He believes that there are two classes of creating gods—one beneficent, and the other malevolent—or that they may be propitiated by flattery, and offended by neglect. He believes that they love justice, as he himself loves justice, when it suits his own interest, but that their love of justice, like his own, is warped by every selfish motive, and every groveling propensity which flesh is heir to. He believes that *they* are susceptible of sensual and of sordid impulses; that they are rivals in love and ambition, and that heaven is as discordant as earth—a perpetual scene of civil wars, and insurrections, never totally suppressed. How deeply rooted in the human heart, are these radical errors, all flowing from the single false conception, that there can be more than one creator God, you may perceive in these lines of the most pious and orthodox, as well as the sublimest of modern poets.

For spirits when they please,
Can either sex assume, or both; so soft
And uncompounded is their essence pure,
Not ty'd or manacled with joint or limb,
Not founded on the brittle strength of bone,
Like cambrous flesh; but in what shape they choose—
Dilated or condensed, bright or obscure,
Can execute their airy purposes,
And works of love or enmity fulfil.

Works of love or enmity! He is speaking of those very deities, for whom the race of Israel often forsook the Lord Jehovah, the Creator and Ruler of the universe. When the mind and heart of man are perverted, to the belief of first principles, such as these, the prevailing sentiment to which they are disciplined, in their relations with the spiritual world, and a future state, is base and servile *fear*. The gods are the very personification of earthly tyranny. If such a people commence a career of philosophical speculation, the first conclusion to which their free-thinkers will arrive, must be, that a multitude of creating gods, is an absurdity to which the free intellect cannot submit; and as the *order* of the universe is the most striking and most impressive of its properties, that a creation so orderly, and so invariably uniform in its operations, must, and can be, no other than the work of *one* Almighty mind.

There is no doubt, that THALES, and PYTHAGORAS, both came to that conclusion.

But the false gods, had priests, and worshipers, and shrines;—and, from the first moment, when the philosopher applies his lever and his screw, to the foundation of the temple of Dagon, he becomes the blasphemer of the gods, and his doom must be the bowl of hemlock, the fiery furnace, or the crucifix.

So it has been, in all ages, and in every region.—And this is the reason why THALES and PYTHAGORAS, so carefully rolled up in profound mystery, all their discoveries in the moral and intellectual world.

At the restoration of the literature of Greece, and Rome, in the fifteenth century, the great work of PROBLEMY had perished in its original language. It existed, as a translation, in the Arabian Almagest, and was universally considered, as containing the only true system of the universe. It was then translated from the Arabic, into Latin, by PURBACH, and MULLER, of Montreal, known according to the custom of that age, by the name of Regiomontanus. In commenting upon the translated work, they ventured to suggest some objections to the foundation of the system itself; that the earth was the centre of the universe, and that, while she enjoyed perpetual repose, the sun, and moon, and all the planets of the solar system, from day to day, revolved round her. Shortly afterwards, NICHOLA COPERNICUS dissolved the spell, restored the sun to his long prostrated supremacy, as the centre of the system, and reduced the earth to her real station among the works of the Creator, as one of the smaller planetary satellites of the sun; while the sun himself, far from being the pre-eminent of nature, is, with his whole appendage of primary and secondary planets, and comets, no more than a relatively insignificant fragment of numberless similar systems, scattered over the regions of infinite space, and, for all we know, surpassing in brightness, all the splendors of the sun, as far as they exceed the twinkling of a fire-fly.

The system of COPERNICUS, was so directly in the face of the testimony of the only sense, by which man can become acquainted with the stars, that, after he had made the discovery, and confirmed himself by observation and calculation, in the belief of its truth, he dared not publish it to the world. Thirty years he kept it confined to his own bosom, or communicated it only to students, in the

same science, on whose discretion and reserve, he could confidently rely. Independently of the difficulty, of reconciling mankind to the belief of a system of creation, contradictory to their senses, the revolution of the firmament, and the immobility of the earth, had been taught as realities sanctioned by the Bible, and had become articles of religious faith. To question them, was to cast a doubt upon the existence of the Creator—To deny the daily revolution of the sun, and moon, was to discredit the adjuration of Joshua, to them, to stand still for a single day. The Astronomer, at the peril of his liberty, or his life, must discover nothing which would require so much as an explanation of the meaning of a passage in Scripture; and COPERNICUS, sensible that the truth is not always to be told, left the firmament to revolve, day by day, round the steadfast and immoveable earth, till, at the close of life, he permitted his system to be printed; but it was not published till after his death. COPERNICUS was born at Thorn, in Prussia, on the 19th of January, 1472, and died at Nuremburg, on the 25th of May, 1543, a few days after his work on the revolutions of the celestial orbs, had issued from the press.

Three years after his death, on the 13th of December, 1546, was born, in the Danish Island of Schonen, TYCHO BRACHE, of the noble family of that name, illustrated by him as it had never been before. The study of Astronomy, kindled by the observation of an eclipse, in the tenth year of his age, was the passion of his life. He studied law, as a profession, at Leipsic; but his nightly vigils were occupied, not in poring over the Theodosian code, the compilations of PAPINIAN, or the ponderous volumes of CUIJACIUS, but in contemplating the majestic scenery of the heavens, and in tracing their courses and their causes, with that prying and pertinacious eagerness, which prompted his last words, repeatedly uttered, in the agonies of death,—*Ne frustra vixisse videar*—that I may not appear to have lived in vain. The American mariner, or traveller, who passes from the North Sea into the Baltic, through the sound, between the Island of Zealand and the Swedish shore, as he approaches the Danish metropolis of Copenhagen, sees a small, seemingly solitary and deserted Island, close upon the Danish side of the strait, and will never fail to be told,—there is the Island of *Huen*—there stood Uraniburg, the Observatory, built at his own expense, by TYCHO BRAHE, on a soil in which his sov-

ereign, FREDERICK THE SECOND, of Denmark, had granted him a life estate, and where, by twenty years of assiduous observation and study of the stars, he contributed his share, a large one, to open to his fellow man, the secret volume of creation, the mystery of the divine architect of the universe. URANIBERG is no longer there—It is of no human being the abode—the owls, and the bats, have wrested it from the dominion of man—But there TYCHO BRAHE, and KEPLER, served their country, and their kind, and its fame, as an appendage to theirs, shall be imperishable as the everlasting hills.

But the greatest flood of light, ever shed upon the science of Astronomy, constitutes the unrivalled glory of the seventeenth century of the Christian era. The true founder of modern Astronomy, is acknowledged by BAILLY, to be KEPLER, born 27th December, 1571, at Wiel, in the dukedom of Wirtemberg; born of a noble, but decayed family, his father, after many years service as a captain in the military service of the king of Naples, was compelled, by poverty, to return to his native country, and there to follow the occupation of an innkeeper; and, even in that condition, was unsuccessful, and fell into sordid indigence. Young KEPLER, was, therefore, bereft of all assistance from his parents, for his support, and cast upon his own resources, to provide for himself. Until his twentieth year, he studied divinity, at Tubingen, and became, for some time, a popular preacher. His teacher of mathematics, MÆSTLIN, prevailed upon him, with no small repugnance, to devote himself to Astronomy. In the twenty-second year of his age, he was professor of mathematics, at Gratz, and published his first work, the *Mysterium Commographicum*; full of cabalistic fancies, concerning the recondite relations and mystic influence of proportional numbers. Throughout his life, he was in the habit of indulging in these day dreams, and was not a little addicted to the practices of judical Astrology. Yet, his first book introduced him to the acquaintance, and recommended him to the favor, of TYCHO BRAHE, by whose invitation, he went to him at Prague, and shortly before his death, was employed as his assistant, and obtained the office of mathematician to the emperor. Here he lived eleven years, in the most astringent penury, the small stipend of his office remaining unpaid. He then resided fifteen years, as professor of mathematics, at Linz; three years afterwards, at Ulm,

and one year, under the protection of the celebrated WALLENSTEIN, at Sagan. He was repeatedly compelled to waste his time, in journeying, to obtain payment of his small pension; and, after passing the last year of his life at Rostock, in the exercise of his profession, died at Ratisbone, on the fifteenth of November, 1650, worn down with cares and affliction, leaving to his family, nothing but an imperishable name.

To the progress of Astronomical science, two distinct and separate operations of the mind are indispensable, — observation and calculation. The first, requiring clear, keen, and distinct vision. This quickness of perception, is the gift of nature, and depends upon physical organization. This faculty is bestowed in a numberless variety of degrees; perhaps not the same, in any two of the human race. Ninety nine in a hundred of mankind, never look to heaven with a searching eye, and live the three score years and ten allotted to their existence, without knowing the difference, between a fixed star, and a planet. Among the labors of Astronomers, has been that of counting the numbers, and publishing the catalogues of all the stars, visible in the firmament, and to facilitate the operation, they have been divided into classes of graduated magnitudes. To the naked eye, of the great mass of mankind, no star of less than the fifth magnitude, can be seen. The favored few, endowed with more perfect optic nerves, can see stars of the sixth, and some, even of the seventh magnitude; and as every class exceed in number, those of all the preceding classes together, the portion of mankind invested with this faculty, has opened to the inspection of his senses, a second world, more populous than that which he enjoys, with the rest of mankind. Before the invention of the telescope, no mortal man had ever beheld a star of less magnitude, than the seventh; glasses are now constructed, which have revealed to the searching eye of the observer, hosts of heaven, down to the twelfth magnitude; and there is every reason to believe, that new accessions of light, will hereafter disclose millions upon millions of these luminaries, never yet seen by the eye of man. COPERNICUS, and TYCHO BRAHE, with all the Astronomers of preceding ages, never saw a star not discernable to the naked eye. But the second operation of the mind, required for Astronomical discovery, is calculation, a talent acquired by study and intellectual labor, and increased wonderfully by long and pertinacious practice.

These two faculties, are sometimes but rarely possessed by the same man, and not unfrequently has it happened, in the annals of Astronomy, that the observations of one man, fruitless, or but partially efficient to himself, have led to the most stupendous discoveries, by the calculations of another. Of this result, perhaps, the most memorable example, is presented in the joint and united labors of TYCHO BRAHE, and of KEPLER. The transcendent merit of TYCHO, consisted in the spirit with which he devoted his life, and an affluent fortune, to the cause of science, and the improvement of the condition of man. But, to turn to the most useful account, for the progress of Astronomical knowledge, the unparalleled mass of TYCHO's observations, the powers of another, and kindred spirit, was indispensable; and that kindred spirit was found in the person of KEPLER. The unanswerable demonstration of the Copernican discovery, that the central body of the solar system, is not the earth, but the sun, was contained in the recorded minutes of TYCHO's observations, especially for a series of the movements for many months, of the planet Mars. But that demonstration, could be made manifest only by mathematical calculations. To this work, so far as mere readiness in the computation of numbers was required, TYCHO was, no doubt, as competent as KEPLER himself; but he was not restrained by religious scruples. The daily revolution of the sun round the earth, had not only been unquestioned in the *Almagest* of PTOLEMY, for upwards of twelve hundred years, but was believed to be sanctioned by divine revelation, in the Bible. The religion of TYCHO, in the encounter with his philosophy, obtained a triumph, honorable to him, but erroneous in fact. He rejected the great, and ever memorable discovery of COPERNICUS, and compounded a system of his own, more complicated even than that of PTOLEMY, whose epicycles he discarded, only to admit them again, because his own system could not be satisfactorily explained without them. KEPLER had gone to live with TYCHO, by his invitation, in the year 1600. In 1601, he died, and by that event, his observations on the planet Mars, fell into the hands of KEPLER, who went to work upon them. The logarithms of NAPIER, were yet in the womb of time—ten folio pages of multiplication, and division, and square, and cube roots, were covered with figures, by KEPLER's hand; one error of casting up, in this process, produced an erroneous result, and baffled

the preconceived hopes of the calculator. The arithmetical computation was repeated: the error of the previous trial, was detected, and the result corresponded with the anticipations of the accountant. Seventy times over, was this process of calculation repeated, by the indefatigable hand of KEPLER, and seven hundred folio pages of figures, attested the fact, that the motion of the planet Mars, in his orbit, was not circular, but elliptical, and that the sun was in one of the foci of that ellipsis. Subsequent calculations, on the movements of the other planets, confirmed the demonstration, as applicable to them, and settled forever the principle, that the sun is the centre of the solar system; and that all the planets revolve round him, in elliptical orbits, in one focus of which, is his place.

The immense stride, in the progress of human knowledge, by the discoveries of COPERNICUS, and of KEPLER, can be estimated only by the man, who, like them, can devote his time and his talents to the study of nature. Every human being can, and to some extent, does, observe the stars. To the eyes of all mankind, the sun and the firmament move from east to west, rising above the eastern horizon, every morning, and setting in the western horizon, at night. This is a false report to the human mind, made by the organ of observation, the human eye. The apparent movement of the sun, and stars, is occasioned by the real movement of the earth, rolling round her axis, and, like the ball of a bowling green, rolling on in an oval orbit, round the sun. The discovery of COPERNICUS, corrected this mistake. But to the eye of man, all the luminaries of the sky, large or small, appear round. He believes them to be spheres, and concludes, that, as they revolve, they must move in circles. The joint and several immense labors, of TYCHO BRAHE, and KEPLER, resulted in the correction of this mistake, which KEPLER communicated to the learned world, at Prague, in Bohemia, in a treatise, under the title of Celestial Physics, set forth in commentaries upon the movements of the star Mars, in the Latin language, in 1609.

The arcana of creation, were opened, by this work, to the inspection of man. Discoveries like these, are of a prolific nature. They breed with unparalleled exuberance. The discoveries and inventions of KEPLER, would require the development of a volume, and your patience has already been strained, beyond the bounds of toleration.

The discoveries of COPERNICUS, and KEPLER, disclosed, and corrected the mistakes of the optic nerve. But, in that same year, 1609, another invention, not the effect of profound study and incessant labor, but of childish sport, and unforeseen casualty, gave new and increased powers to the orb of vision. JAMES METIUS, a mechanic, of the city of Alcmær, in Holland; observed, on a winter's day, some school boys, sporting on the frozen canal, and adjusting fragments of the ice to the two ends of their ink-horns, and looking through them, to see the objects, at which they looked, with enlarged dimensions. METIUS took the hint, and inserted into a wooden tube, an eye glass, at due focal distance from a double object glass, one convex, and the other concave, and presented one, as a sample of his invention, to the states general of the United Netherlands. The first use of these instruments was made by the navigators of the ocean; but one of METIUS' spy glasses, having found its way to Venice, was seen there by GALILEO GALILEI, a native of Pisa, born on the 15th of February, 1564.

GALILEO was, himself, one of the master spirits of his age, and of all ages. The science of Astronomy, and the knowledge of the structure of the universe, is scarcely less indebted to him, than COPERNICUS, TYCHO BRAHE, or KEPLER. To the ingratitude or neglect of the common herd of the rulers of mankind, suffered by all those benefactors of the race, he has the additional claim of the merit of martyrdom in their cause. At the very time when this new engine of discovery, the principle of the telescope, came to him like the present of a new pair of eyes, he was already involving himself in controversy, religious and philosophical, in support of the Copernican system, maintaining the central supremacy of the sun, and the subordinate revolutions of the planets round him. He immediately improved the spy glass of METIUS into a telescope; let in a new flood of light upon the Astronomical observer's eye, and discovered by his own observation, several stars before unknown. The four satellites of Jupiter, the waxing and waning phases of the planets, Mercury and Venus, and the spots on the sun and moon. He was denounced, before the tribunal of the inquisition, and, in his own defence, wrote memoir upon memoir, to prevail upon the Pope, and the inquisitors, to declare the Copernican system, to be in strict conformity with the Holy Scriptures. As the Pope, and seven cardinals, appointed by him to solve this knotty

question, pronounced, that the doctrine of the earth's motion, was an absurdity in physics, and a damnable heresy in religion, GALILEO was expressly forbidden, ever again to maintain, by word of mouth, or in writing, that the rotary motion of the earth was countenanced by the holy scriptures. Cardinal BELLARMIN, charged with the duty of announcing this sentence to GALILEO, gave him at the same time a certificate, that it was not pronounced, as a penalty; and that GALILEO was not required, even to retract his opinions; but was merely prohibitory, forbidding him from ever again maintaining it. He promised obedience, and observed it, for a period of thirty-seven years; when, in 1652, he published dialogues, to prove the immobility of the sun, and the planetary rotation of the earth round him. He was again summoned before the court of inquisition. Seven cardinals again pronounced his theory impious and absurd, and he was condemned, as a relapsed heretic, to three years' imprisonment, and to repeat the seven penitential psalms, once a week during that time.

At 70 years of age, GALILEO was compelled by the sentence of these inquisitor cardinals, to crave pardon for having maintained the truth; and abjured it as absurdity, error and heresy, upon his knees, with his hands upon the gospel. With what spirit he performed this ceremony, you may imagine, from the fact that, on rising from his knees, without raising his eyes from the ground, he stamped upon it, and said—"Yet she moves!" He was finally discharged from prison, but in the last years of his life was afflicted with blindness, brought on by the intenseness of application to his telescope. He died at Florence on the 6th of January, 1641, and was buried in the Church of the Holy Cross; not without a long interval, during which his friends and admirers, desiring to erect a monument to his memory, by the side of that of MICHAEL ANGELO BUONAROTTI, were compelled to defer the execution of their purpose, till the popular prejudice against the apostle of truth, should have subsided into oblivion. In 1737, when it was no longer absurdity or sacrilege to believe, that the earth rolls round her axis, and round the sun, the monument was erected.

In the lives of COPERNICUS, of TYCHO BRAHE, of KEPLER, and of GALILEO, we see the destiny of almost all the great benefactors of mankind. We see, too, the irrepressible energies of the human mind, in the pursuit of knowledge and of truth, in conflict with

the prejudices, the envy, the jealousy, the hatred, and the lawless power of their cotemporaries upon the earth. The institution, by the officers of which, GALILEO suffered every persecution, short of death, which man could inflict upon him, was the invention of IGNATIUS LOYOLA, a man, in all the properties which constitute greatness, not inferior to GALILEO himself. The profound meditation, the untameable activity, the untirable pertinacity, the unconquerable will, stiffening against resistance, overcoming obstacles, bearing down opposition, sweeping its way along to its intended object, and, like faith, casting mountains into the sea, were alike in them both. What, then, was the difference between them? It was in the objects, to which they severally applied these properties, in action. IGNATIUS, under the influence of religious fanaticism, invents an engine of despotic power, a rod of iron, and puts it into the hands of a frail mortal man, already invested, by the infatuation of the age, with imputed infallibility. GALILEO interrogates the physical creation, for the causes of its own existence, and his ultimate object, is the triumph of truth. To which of the contending causes must the voice of posterity say—God speed? To the champion of truth—and the truth shall ultimately prevail. But I may no longer dwell on the fascinating theme. Absorbed in the gigantic energies, and more than heroic labors of COPERNICUS, TYCHO BRAHE, KEPLER and GALILEO, what time or space have I left, to speak to you of NEWTON, the consummation of them all; the man of whom, it was said, even by a cotemporary poet, with more than poetical justice,

Nature, and nature's laws, lay hid in night,
God said, let NEWTON be, and all was light.

The discoveries of NEWTON were so great, and so various, that a mere enumeration of them would require a discourse too expansive, to be fitted for the present occasion. He was born at Wools-trope, in Lincolnshire, on Christmas day, O. S. 1642. His first essays were in optics, the grinding of glass, and the theory of light. The magnifying, and approximating power of light, seen through a tube, and the medium of convex glass, had already become familiar, by the inventions of METIUS and GALILEO; but the changes of the nature of light, by reflection and refraction, in

passing through glass, had not been made known, and DESCAR-
TES, one of the brightest geniuses of France, had published a
treatise maintaining, that light was a simple and homogeneous
substance. The papers upon light and optics, were first read to
the Royal Society. They preceded his mathematical principles
of Natural Philosophy, published in 1687, containing his theory
of the construction of the Universe, upon the principle and laws
of gravitation.

It was the good fortune of NEWTON, to be born, and to live
in a country, where there was no college of Cardinals, to cast him
into prison, and doom him to spend his days in repeating the
seven penitential psalms, for shedding light upon the world, and
publishing mathematical truth. NEWTON was not persecuted by
the dull and ignorant instruments of political, or ecclesiastical
power. He lived in honor among his countrymen—was a mem-
ber of one parliament—received the dignity of knight-hood—held
for many years a lucrative office, and at his decease, was interred
in solemn state, in Westminster Abbey, where a monument records
his services to mankind, among the sepulchres of the British
Kings.

From the days of NEWTON, down to the present hour, the sci-
ence of Astronomy has been cultivated, with daily, deepening in-
terest, by all the civilized nations of Europe. The institutions
of the Royal Society, and of the Greenwich Observatory in Eng-
land, and of the Academy of Sciences, and of the Royal Observa-
tory in Paris, have given to the study of the heavens, the digni-
ty of schools, of which nations are the pupils. The example has
been followed by Prussia, Sweden, several German, and several
of the Italian states, and above all, by Russia, whose present sov-
ereign, has made the pursuit of knowledge a truly imperial virtue.
The skies of St. Petersburg, and of Moscow, are among the most
unfavorable of the earth, for Astronomical observation; the perpet-
ual snows of winter, and the perpetual day light of summer, being
equally unpropitious to that state of the atmosphere, in which,
alone, the stars can be seen. But Astronomy, has always been one
of the sciences, most assiduously cultivated, by the Academy of
science, immediately under the inspection, and patronage of the
Emperor. During the reign of Alexander, the Secretary of that
Academy, was SCHUBERT, the author of two systems of Astrono-

my, in the German language; one for the most learned in the science, and the other, for the common, popular reader; and both among the most perfect treatises upon the subject extant, in any language. At the University of Dorpat, there had long been an Astronomical Observatory, and in 1813, the observator, appointed to that edifice, was G. G. STRUVE, whose estimate of his duties in that capacity, is laid down in his own words, that he regards the duty of laboring for the *progress* of the science, which he cultivates, as the most important end of his existence. Thirty years of labors, invigorated by the spur of such motives, cannot have passed away, without results of the first importance; and Mr. STRUVE, is at this day, one of the most eminent Astronomers of the age.

In the seventeenth century, the invention of the telescope, gave to the Astronomical observer, a new sense for discovery in the heavens. In the latter part of the eighteenth century, the enlargement of the field of vision, by increasing the size of the glasses, and the length of the telescopic tube, gave a new increase of power to the orb of human vision, and its first result was the discovery by the first HERSCHELL, the inventor of the new tube, of a planet never before known, followed by many other subsequent discoveries, equally wonderful. And in the first half of the nineteenth century, a third enlargement of the visual orb, by object glasses of fourteen inches diameter, and tubes of twenty feet focal distance, unlocks again, the secret chambers of the firmament, finds a parallax in the bright star of Lyra, and exhibits solar systems of stars, revolving round each other, within limited space, by the hundred and the thousand.

The inventor of this instrument was JOSEPH FRAUNHOFER an ingenious mechanic of Munich, in Bavaria. Did I say an ingenious mechanic? Rather, should I have said, one of those productions of nature, which once, in an age, she exhibits as symbols and samples of creative power. He was born at Straubing, in Bavaria, of parents so indigent, that they could not give him the education of a common school. His father was a glazier, and destined him to his own trade. But in his eleventh year he lost both his parents, and his guardian bound him for six years to a glass maker in Munich, without charge or compensation. Towards the close of his apprenticeship, the house of his master, in which he

resided, fell in, and he was by a special interposition of Providence, and extraordinary exertions, encouraged by the personal presence and cheering of the king of Bavaria, drawn out uninjured from the ruin. The king of Bavaria, taking compassion at his misfortune, made him a present of eighteen ducates, with part of which, he purchased books upon optics, and with the rest, he bought from his master the last half year of his time. He was reduced to the necessity of engraving visiting cards for a subsistence, and struggling for years, at once for knowledge and for bread; after many disappointments and disasters, he was at last admitted as a partner in the celebrated manufacturing establishment, for optical and mathematical instruments of Utzschneider and Reichenbach. From that time, the establishment soon acquired the reputation of the first optical instrument makers in Europe. FRAUENHOFER not only succeeded in making larger object glasses, than had ever been attempted, but by a composition of materials, known only to himself, he has made his glasses more perfect, for the transmission of light, than any that had ever been made before. In 1824, he furnished to STRUVE, for the University at Dorpat, the instrument which has been called his great Achromatic Refractor, afterwards still more enlarged by a similar instrument, for the new Observatory of Pulkova. There, at this hour, perhaps, is STRUVE plying his optic nerve, to the detection of some never yet discovered wonder of the firmament, with an object glass of fourteen inches aperture, a tube of twenty-one feet focal distance, and a magnifying power of two thousand fold duplication.

With the great Achromatic Refractor of Dorpat, STRUVE has been from the year 1824, constantly observing the most interesting phenomena of the heavens. His observations upon the moon, upon the planet Saturn, and upon many other celestial objects, have been of the most interesting character. But the great and transcendent labors of STRUVE, have been concentrated upon the ascertainment of the numbers and properties of the double, treble and quadruple stars, of which, at three several periods, he has published catalogues. Of the labors incident to these operations, some estimate may be formed, by reflecting on the fact, that in the space of two years and a half, the passage of the meridian was noted of one hundred and twenty thousand stars, from the first to the eighth magnitude. That three thousand one hundred and

twelve of those stars, were ascertained to be double stars. Eleven years of these observations were consumed with inferior instruments, and twelve years with the great refractor of FRAUENHOFER. They are not yet completed.

The discovery of a new planet, by the elder HERSCHEL, in 1781, was an electric spark in the atmosphere of Astronomy. In compliment to his royal patron, GEORGE the third, he called it the Georgium Sidus. The learned Astronomers of Europe, for some time, moved by an impulse of gratitude to the finder, gave it his name, and called it Herschel. The classical taste of the German scholars, following the analogy of the names given to the ancient planets, called it Uranus, which denomination, has finally prevailed, and been followed, by naming the four further discovered planets, Juno, Vesta, Ceres and Pallas—discoveries, the merit of which, may be ascribed to HERSCHEL, as if he had been the first to see them himself.

The new impulse given by this glorious achievement, of HERSCHEL, to the study of physical Astronomy, pervaded all Europe. The class of observers was multiplied, and their visual organs were quickened; Observatories started up in every quarter, like the enchanted castles of romance. Is it not strange, that the spark of enthusiasm never crossed the Atlantic? That the star of empire, then streaming like a Comet, in her western course, should not have been outstripped by the star of science; or at least, have illuminated, with double splendor, the path of the star of power?

The discovery of HERSCHEL, was made in 1781, amid the fiercest flames of the war of independence. The new nation entered upon the magnificent scene of sovereign, independent potentates, with a progression of principles, elevating the standard of human virtue, to its highest pitch of perfection. She announced herself as the friend and patroness of science; she proposed to her sisters, of the European world, the abolition of war upon the Ocean, for ever. Her Congress issued proclamations of peace and protection, to the English navigator of discovery, when winding his way round the globe, upon the seas. How, and why was it, that she seems to have received in sullen, if not in envious silence, the announcement of that sublime discovery, of a new planet, added to the glory of God, in the works of creation; at the sound of

which, the whole learned world of Europe shouted and clapped their hands for joy?

The theme is painful—let me pass it over. Not such, was the influence upon the youthful mind of NICHOLAS, the imperial autocrat of all the Russias, of the new discoveries in the region of the stars, accomplished by the genius of FRAUENHOFER, and the never ceasing vigilance and untiring penetration of STRUVE. Not a year has passed away since the great refractor of FRAUENHOFER, has been the instrument in the hand of STRUVE, without bringing to light some new phenomena, interesting to the progress of science. The promotion of knowledge has wound itself into the heart of the Academy of Sciences, of the minister of public instruction, of the Emperor NICHOLAS himself.

Besides the Observatory at Dorpat, there had been, from the time of the institution by PETER the Great, of the Academy of Sciences, at St. Petersburg, an Astronomical Observatory, connected with it there. Similar establishments had, in later days, been erected at Abo—afterwards transferred to Helsingfors—at Nicolaief, on the Black Sea—at Moscow—Kasan and Kiew. Various causes had combined to render these institutions inefficient, and the tower in the city of St. Petersburg was unfavorably situated for the purposes of observation. The heights of Pulkova, between St. Petersburg and Zarsko Zelo, had long been noticed as admirably situated for erecting upon them an Observatory, and when the results of the use of FRAUENHOFER's great refractor at Dorpat began to ring in the public ear, the Emperor NICHOLAS commanded a plan to be prepared, and presented to him, for an Observatory of the first class, to be erected there.

A plan was accordingly prepared in April, 1834, with estimates of the expense required for the erection of the building, and for the purchase of suitable instruments for observation; the first amounting to 346,500 rubles, and the second to 135,000 rubles—the value of the ruble being 74 cents of our currency. The Emperor immediately issued an order to commence the work, under the direction of three commissioners, members of the academy; and that 100,000 rubles should be placed at the disposal of the minister of public instruction, for the prosecution of the work. It was accordingly commenced, vigorously prosecuted, and finally completed, at a cost of little less than one million of rubles; and the Observatory

of Pulkova, has been, for years, the most magnificent and best appointed establishment, for the observation of the heavens, in the world.

Of this truly imperial munificence, much must undoubtedly be ascribed, to the generous and liberal spirit of the Emperor NICHOLAS; but, after all, it is but an exemplification of the spirit of the age. Of such exemplifications, the annals of European science are full. They are manifested, in the number of Astronomical Observatories, illuminating every part of the European continent—in the number of eminent observers, stationed at those watch-towers of science,—in those cotemporaneous discoveries of three planets at Bremen, in Germany, and another at Palermo, in Sicily,—in the number of periodical publications, devoted to the continual development of the phenomena of the heavens,—in the advances to perfection, in the theory of the science—from the solar centralism of COPERNICUS, and the planetary laws of KEPLER, and the gravitation of NEWTON, to the celestial mechanism of LA PLACE, and its improved revisal of our own BOWDITCH. Finally, in the institution of Astronomical societies, and particularly that in our mother country, within the last quarter of a century, blooming in youth, and already bearing, from year to year, fragrant and delicious fruits, for the harvest of the human mind.

But what, in the meantime, have *we* been doing? While our fathers were colonists of England, we had no distinctive, political, or literary character. The white cliffs of Albion, covered the soil of our nativity, though another hemisphere first opened our eyes to the light of day, and oceans rolled between us and them. We were Britons born, and we claimed to be the countrymen of CHAUCER and SHAKESPEARE, MILTON and NEWTON, SIDNEY and LOCKE, ARTHUR and ALFRED, as well as of EDWARD, the black Prince, HARRY, of Monmouth, and ELIZABETH. But when our fathers abjured the name of Britons, and “assumed among the powers of the earth, the separate and equal station, to which the laws of Nature, and of Nature’s God, entitles them,” they tacitly contracted the engagement for themselves, and above all, for their posterity, to contribute, in their corporate and national capacity, their full share; aye, and more than their full share, of the virtues, that elevate, and of the graces that adorn the character of civilized

man. They announced themselves, as *reformers* of the institution of civil society. They spoke of the laws of Nature, and in the name of Nature's *God*; and by that sacred adjuration, they pledged us, their children, to labor with united and concerted energy, from the cradle to the grave, to purge the earth of all slavery—to restore the race of man, to the full enjoyment of those rights, which the God of Nature, had bestowed upon him at his birth—to disenthral his limbs from chains—to break the fetters from his feet, and the manacles from his hands, and to set him free, for the use of all his physical powers, for the improvement of his own condition. The God, in whose name they spoke, had taught them, in the revelation of his gospel, that the only way in which man can discharge his duty to him, is, by loving his neighbor as himself, and doing with him, as he would be done by,—respecting his rights, while enjoying his own, and applying all his emancipated powers of body, and of mind, to self-improvement, and improvement of his race.

Among the modes of self-improvement, and social happiness, there is none so well suited to the nature of man, as the assiduous cultivation of the arts and sciences. The opportunities and dispositions of individuals, for the cultivation of any one specific art or science, are infinitely diversified. One general impulse nerves the arm, and animates the soul, but, in giving direction to that impulse, every one may best follow the bent of his own inclination. We have been sensible of our obligation to maintain the character of a civilized, intellectual, and spirited nation. We have been, perhaps, over boastful of our freedom, and over sensitive to the censure of our neighbors. The arts and sciences, which we have pursued with most intense interest, and persevering energy, have been those most adapted to our own condition. We have explored the seas, and fathomed the depths of the ocean, and we have fertilized the face of the land. *We*—*you*—*you*, have converted the wilderness into a garden, and opened a paradise upon the wild. But have not the labors of our hands, and the aspirations of our hearts, been so absorbed in toils upon this terraqueous globe, as to overlook its indissoluble connection even physical, with the firmament above? Have we been of that family of the wise man, who, when asked where his country lies, points, like ANAXAGORAS, with his finger to the heavens.

Suffer me to leave these questions unanswered. For, however chargeable we may have been, with inattention or indifference, to the science of Astronomy, heretofore,—you, fellow citizens, of Cincinnati—you, members of the Astronomical Society, of this spontaneous city of the West, will wipe that reproach upon us, away. That edifice, of which, under your charge, the corner stone is now to be laid, will rise, a lasting monument of your ardent and active zeal, to connect the honor of your country, with the constant and untiring exploration of the firmament of heaven; and may the blessing of Him, who, from his lofty throne, rules the universe in wisdom and goodness, crown your labors with success.

On proceeding to lay the Corner Stone, Mr. ADAMS addressed the surrounding multitude as follows:

GENTLEMEN OF THE ASTRONOMICAL SOCIETY, AND
FELLOW CITIZENS:

The usages of civilized life, made it a common practice, to mark the erection of certain edifices, devoted to purposes of more extensive interest, than the common dwelling houses of individuals, by the celebration of solemnities at the laying of their corner stone. The palaces of monarchs; the churches devoted to the worship of Almighty God; The halls of legislation; the tribunals of judgment; the places of the assemblage of men, for the exercise of the rights of power; the house for the receipt of customs; the Mint, for the coinage of money; the exchange of the merchant; the Bank or Insurance Co. of the dealers in money, or the adventurous navigator; the market house of the multitude; the hospital of the friendless diseased; the prison or penitentiary for the transgressors of the law; the retreat for the deaf and dumb, and the blind; the receptacles for the maniac, the lunatic, and the idiot; the seminaries for education, universities, colleges and schools, all, have been from time to time, dedicated with grave and solemn dignity, to the purposes of their construction.

This usage, long established in the older world, has been partially adopted, and frequently imitated in ours. We have, indeed

no monarch from his palace, to rule with his sceptre of iron, a groaning, oppressed and submissive people, but we have built a palace for the chief magistrate of our union ; and all the other edifices which I have here enumerated, besides the mighty works for the supply of water to populous cities, not to speak of light houses, bridges, turnpike roads, and railways that have, in every part of our Union, been auspicated at their inception, by ceremonies invoking the blessings of God upon the labor and enterprise of man, for the improvement of his own condition. Cast your intellectual eye over the surface of that immense territory, watered by the St. Lawrence and the Mississippi, from the St. John to the Sabine, and from the Neversink, to the mouth of the Columbia, and at every step on the soil over which the foot of civilization has trod, you perceive spires and turrets, steeples and pinnacles pointing to the skies, already completed, or standing up as if by enchantment, under the plastic labor of her hands. You see you are no longer in the wilderness of savage men. You see provisions made for the cultivation of the mind, not less than of the soil. The cities gathered, and gathering on the shores of the ocean, the margin of rivers, and the borders of the lakes, tell you that art and science, commerce and navigation, law and justice, christian truth, and virtuous morals, have fixed their abode on the borders of the western world ; and as you pass from the coast to the interior, the gardens, the corn fields, and the orchards ; the bleating flocks and the grazing herds ; the barn door fast, and the courser in the stable, and the watch dog at the gate, were you not even to hear the sound of the human voice, would, by their presence, attest that the hunter is no longer there: That the forest has fallen, and is falling under the axe of civilized man, and rising again under the hammer and trowel of the carpenter, the farmer, and the mason, in the form of permanent and comfortable dwellings.

The scene before your eyes, is covered with edifices, the corner stones of which have been laid with religious rites, or in the ceremonies of solemnity, importing that the purposes of their erection were subservient to the wants, comforts, or enjoyments, not of single families, but of successive multitudes of the race of man. In the midst of the delight with which your hearts will expand, at the contemplation of this cheering view, does your love of the

arts and sciences of civilization, which are spreading this enchanting scene before you, prompt the enquiry, whether, among these monuments of civilized industry, perseverance, ingenuity, there is one light house of the skies—one tower erected on the bosom of the earth, to enable the keen-eyed observer of the heavenly vault, and the profound calculator of the infinite series, to watch, from night to night, through the circling year, the movements of the starry heavens, and their unnumbered worlds; and report to you, and to all the civilized race of man, the discoveries yet to be revealed to the tireless and penetrating eye of human curiosity? Look around you, fellow-citizens—look from the St. John to the Sabine—look from the Neversink to the mouth of the Columbia, and you will find, not one! not one! or, if one, not of our erection, but from funds liberally poured out from the coffers of that mother-land, from whom our fathers have decreed an eternal separation.

FELLOW-CITIZENS!—The Astronomical Society of the city of Cincinnati, have determined to wipe the reproach from the fair fame of our beloved country. Here—upon this spot, they have determined, shall arise an edifice, devoted to the cultivation and advancement of the science of Astronomy—devoted to a skillful and persevering search into the laws of the physical creation. For the execution of this purpose, they have done me the honor, to invite me from a distance of a thousand miles, to come and share with them, in the office of laying the corner stone of that edifice. And for the performance of that service we are now assembled.

Let us proceed, then, so to do; and here, in the presence of the vast multitude of the free citizens of the United States of America, of the State of Ohio and of the city of Cincinnati, I do lay this corner stone, invoking the blessing of Him in whose presence we all stand, upon the building which is here to rise, and upon all the uses to which it will be devoted—upon the observators and other officers who may be employed in it—upon the society by whose will it is constructed; upon the people of the city where it will stand, and the State, to which they belong; and finally, upon the whole North American Union, and the whole brotherhood of *Man!*

At the close of the Oration, the Society being called to order by the President, the following resolution was adopted unanimously.

Resolved, That the sincerest thanks of this Society are due to Mr. ADAMS, for the able Address which we have just heard, with so much interest and satisfaction, and that he be requested to furnish a copy for publication.

APPENDIX.

Extract from an Address, delivered by Mr. ADAMS, to his Constituents, at Dedham, Mass.

And now, my friends, fellow-citizens, and constituents, we are for the present to part. Speed me with your blessing, as I leave mine with you, upon yourselves, your wives, your children, and all who are dear to you.

With the dawn of to-morrow's day, I propose, if it be the will of God, to leave my home, in your service, to repair to the city of Cincinnati, there, at the invitation of a learned society, to give them my humble aid, in laying the corner stone of an Astronomical Observatory.

There may be among you some, ready to inquire, what has that to do with your service? I will tell you.

When, in the midst of that terrible and sublime trial of our forefathers, which rent in twain the ties of the social compact, by which they were bound in allegiance, and in fealty, to the sovereign of the British Empire, the people of the several States of the Union, were advised by the Revolutionary Congress, "to adopt such a government as should, in the opinion of the representatives of the people, best conduce to the happiness and safety of their constituents in particular, and of America in general," the people of the State therefore, known as the colony of Massachusetts Bay, did, in compliance with that recommendation, after great, protracted, and repeated deliberations, adopt such a constitution: which, in its most important provisions, modified, as from time to time the people of the State have deemed expedient, remains the constitution of the commonwealth at this day—and in one of the chapters yet in force, there is a declaration that "the encouragement of arts and sciences, and all good literature, tends to the honor of God, the advantage of the Christian religion, and the great benefit of this and the other United States of America."

In this paragraph, you will perceive, that direct reference is had to the motive, set forth in the recommendation of Congress; and

the two paragraphs combined together, bear the precious and solemn testimonial of our ancestors, the people of Massachusetts Bay; that the patronage and encouragement of the arts and sciences, and of all good literature, is one of the most sacred duties of the people of Massachusetts in all ages. It is enjoined upon their children, as a part of their duty to God. It is urged upon their posterity, as always adapted to promote their own happiness, and the general welfare of their country. This obligation, my constituents, is now specially incumbent upon you. The voices of your forefathers, founders of your social compact, calling from their graves, in harmony louder and sweeter than the music of the spheres, command you, in piety to your God, and in patriotism to your country, to patronize and encourage the arts and sciences, and all good literature; and I deem it, as your representative, a tacit and standing instruction from you, to perform, as far as may be my ability, that part of your constitutional duty for you. It is in this sense, that, in accepting the earnest invitation from a respectable and learned society, in a far distant State and city of the Union, to unite with them in the act of erecting an edifice, for the observation of the heavens, and thereby encouraging the science of Astronomy, I am fulfilling an obligation of duty to you, and in your service.

There is not one study in the whole circle of the sciences, more useful to the race of man upon earth, or more suited to the dignity of his destination, as a being endowed with reason, and born to immortality, than the science of the stars. There is none that so urgently needs the protection, patronizing and encouraging hand of power, in its pursuit. Other sciences may be cultivated by individual exertion, by solitary toil, and at little cost—but for the discovery and investigation of the secrets of the skies, expensive edifices, still more expensive and complicated instruments, the combined labors of exquisitely talented mechanics, of eagle-eyed observers, of profound and skilful mathematicians, are all indispensably necessary; and, without the fostering aid and encouragement of the powerful, the affluent, and the liberal, these cannot be obtained. The history of Astronomy has been, in all ages, the history of Genius and Industry, in their blazing light and untiring toil, patronized by power.

From the Ptolemies of Egypt, and Alexander of Macedon, from

Julius Cæsar to the Arabian Caliphs, Haroun Al Rachid, Almamon and Almanzor, from Alphonso of Castile, to Nicholas, the present Emperor of all the Russias, who, at the expense of one million of rubles, has erected at Pulkova the most perfect and best appointed Observatory in the world; royal and imperial power has never been exercised with more glory; never more remembered with the applause and gratitude of mankind, than when extending the hand of patronage and encouragement to the science of Astronomy.

You have neither Cæsar nor Czar, Caliph, Emperor nor King, to monopolize this glory by largesses, extracted from the fruits of your industry; the founders of your constitution have left it as their dying commandment to you, to achieve, as the lawful sovereigns of the land, this resplendent glory to yourselves—to patronize and encourage the arts and sciences, and all good literature.

FELLOW-CITIZENS: There is a time to abstain from the utterance even of good words. I am aware that there is another and a different point of view from which the subject is to be considered, and that many of you may be of the opinion, that the first of virtues in a republic, is parsimony, and that expensive undertakings for the patronage and encouragement of arts and sciences, are neither exacted by the constitution, nor required by a wise and prudent policy, at the expense of the people.

I acknowledge the principle, that the most scrupulous economy and frugality, in the application and management of the funds derived from the labors and resources of the community, is among the most sacred duties of all your representatives, and that not a dollar of their money should ever be expended by those to whom the custody of their resources is entrusted, but for purposes tending to the promotion of their interest, and the happiness of the people. The building of which I am invited to aid in laying the corner-stone, is to rise upon the foundation of voluntary contributions, by the members of a private society, and although destined, as I hope and trust, to yield results of honor and of profit to our whole country, will not draw one dollar of taxation from the public purse.

Let me, then, indulge the hope, that I do not deceive myself by the belief, that in accepting this invitation, personally so honorable to me, all my gratitude is due to the distinguished citizens

and excellent society by which it is tendered; but that in undertaking this journey at this season of the year, and at this period of my life, for the solitary purpose of laying, in a far distant State, the corner-stone of an edifice, devoted to the cause of science, I am still discharging a duty in your service—and if, in after time, from the summit of that edifice, the light of a clearer vision and deeper insight into the works of creation, shall be shed upon the race of man, may the memory of your children be for one moment reminded, that in the dedication of that building, *your Representative* took a part, and that in departing for its performance, he was cheered by the smile of your approbation, and sped on his way by your good wishes and prayers, that the services may be successfully performed.

CONSTITUTION

OF THE CINCINNATI ASTRONOMICAL SOCIETY,

Adopted May, 1842.

PREAMBLE.

BELIEVING it to be the duty of every people, to foster science, and to add, as far as possible, to the general stock of human knowledge; recognising to the fullest extent, the claims which the world has on the several republics, composing the United States, to contribute to the promotion of science, in proportion to their natural, social and constitutional advantages; realising the truth, that in our own country, and under a republican form of government, the people must hold, with respect, to all great scientific enterprises, that position of patrons, which in monarchical governments is held by Kings and Emperors; and knowing that our country is comparatively deficient in means and instruments, to accomplish original observations in Astronomy: Therefore, for the purpose of furnishing our city with an Observatory and Astronomical Instruments, in all respects